UNBoxed

A Journal of Adult Learning in Schools

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Above: Display of student work at High Tech High Chula Vista

cover: Image by HTHI student Josh Shtein. For details on this project, see p 64

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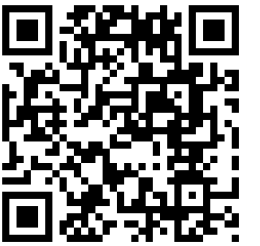
Welcome

The Editors



In this issue we return to themes of adult learning and collegiality in schools. Katie Morrison and Matt Swanson describe an environment where interdisciplinary collaboration leads naturally to collaboration with artists and experts in the community. Dan Wise discusses lessons learned from "doing the project first" and creating prototypes of the work his students will produce. Zoltan Sarda and Amy Reising ask how we might best support not only new teachers, but also their mentors. Susan Foley and Gretchen Morse offer a broader view of mentoring in a school where everyone—students and staff—assumes the role of mentor or mentee, depending on the circumstances. Ewan McIntosh pursues mutuality as a design issue, maintaining that teachers do too much of the work in problem-based learning, and that students should learn to be not just problem solvers, but problem finders.

As usual, student voice and choice figure prominently in our offerings. At DC Prep—an inner city charter school under pressure to raise test scores—Katie Michaels finds ways to leverage "basic skills" routines to foster critical thinking as her fifth-graders engage in peer critique.

Bobby Shaddox introduces "graffiti discussions" as a way to encourage all voices to emerge in the classroom. Peter Jana and Daisy Sharrock describe presentations of learning as an opportunity for students to engage in critical thinking through Socratic dialogue. Don McKay experiments with student choice in test taking, offering students the option of collaborating or work alone. Kiera Chase takes voice and choice into the digital realm, where students create math instructional videos, aided by peer and expert critique and inspired by the prospect of a public audience for their work. Cindy Jenson-Elliott advocates for autonomous, hands-on play as opposed to the pre-packaged, don't-touch environments of certain futuristic visions.

Melissa Agudelo, in her own voice, offers a vision of the leader as one who listens, models, pushes, and supports the community in its efforts to reach all students. Tina Schuster Chavez describes her efforts to help her school achieve a diverse student body, and her realization that it's not about marketing—rather, schools must earn the trust of the populations they wish to serve.

UnBoxed readers may use their smartphones to link to related content while reading. To get started, simply download the free Microsoft Tag application on your phone. Then, wherever you see a "tag" or icon, open the application and scan it with your phone's camera. A website, video, or document will appear, offering further information and context.

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.

As a peer-reviewed journal, we wish to thank the K-12 and university educators who have reviewed our submissions 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


Quality
of
Character
Who is the
Slob in the
room and Why is
he/she there?

Graffiti Discussions: Igniting the Silent Majority

Bobby Shaddox
High Tech Middle School, San Diego

I read aloud, "The main thing to do is pay attention. Pay close attention to everything; notice what no one else notices. Then you'll know what no one else knows, and that's always useful." I close my book and pause dramatically. Silence. I scan the classroom and search for evidence of deep thinking. More than two dozen students squirm in their seats and rifle the pages of their books nervously. "What is the main character referring to in this passage?" I ask slowly and deliberately. Only three hands pop up. Everyone else sits silently.

I'm a humanities teacher. Because one of my passions is nurturing a love of reading in my students, we read at least two novels a year as an entire class. However, over the years I have consistently found that our full-class discussions around these novels favor the involvement of a minority of outgoing, confident students. Hoping to uncover the perspectives of my more reserved students, I informally surveyed them. They told me that they don't participate in class discussions for a variety of reasons ranging from social anxiety to variations in learning styles. Over the last two years, I've addressed the roadblocks

to participation by creating an alternative to spoken, full-class discussions. This alternative has ignited the silent majority and created more equitable conversations. I call it graffiti discussion.

From Quiet Drizzle to Massive Puddle: The Formation of a Graffiti Discussion

I first got the idea for graffiti discussions from a practice, used widely at the High Tech High schools, called chalk talks. Graffiti discussions take the notion of a group brainstorm to a more organized and literary level, incorporating reading comprehension skills. The "discussion" is silent. It takes place in writing on a wall via markers, chalk or sticky notes. The activity invites all students to participate simultaneously and allows them to see and connect their writing to each other's thoughts. The conversation builds upon itself, allowing students access from multiple points and emphasizes sharing ideas, rather than winning a debate or being "right." Through graffiti discussions we aim to develop students' skills and confidence as critical readers. The socially constructed nature of the activity breaks students out of isolation and helps them share interpretations. Students get the opportunity to check their ideas against those of their peers and the teacher.

I have always found that the initial success of a classroom activity is contingent on setting up clear and simple norms. Graffiti discussion begins with these initial agreements:

1. We let our pens do the talking. Graffiti discussions are silent.
2. We take chances with our ideas and don't worry about being right.
3. We do our best to build on each others' ideas and lift each other up.
4. Every student adds to the conversation at least once.

As our class practices and improves the process, we revisit these norms and add to them where we see fit.

Graffiti discussions take place while students are silently reading the class novel. Students write questions, connections, passages and comments in their humanities journal and contribute their most compelling ideas to the white board. In order to assure full participation, I float around

the class and plant seeds of encouragement, coaxing reluctant students to share their ideas on the wall. The discussions are like rainstorms. They begin with a quiet drizzle (one or two catalysts) and develop into a massive puddle of ideas within half an hour. Students shared their thoughts, using expo-markers, on a whiteboard via the following modes, which they note next to their contribution:

Modes of Communication in Graffiti Discussion

Question	Students may ask a question in order to understand further or push their classmates' thinking further.
Answer	Students may answer anyone's question. They're encouraged to use the text as evidence to support their response.
Connection	Students may write about a connection they make with the text. It can be a personal experience or something from another book, movie or TV show.
Significant Passage	Students can select an important passage from the text that will spark conversation on the white board.
Comment	Students can make a comment about a question, answer, connection or significant passage.

How Do Students Experience Graffiti Discussion?

I've always taken it as a good sign when students approach me before class and ask if we'll be doing a particular activity. "Will we be doing a graffiti discussion today?" is a common question at my classroom door. Students enjoy the transformation of a typically solitary activity (reading) into a socially interactive activity. One kid explained, "I like graffiti discussions because everybody gets to react and answer each other's questions instead of writing it on a piece of paper." But their interest extends beyond social stimulation. Students also note that the activity levels the playing field for everyone and facilitates peer-mentorship. As one student pointed out:

> "I think asking questions in graffiti discussion is really good. Because, if a student doesn't know what to do they can actually just write it on the board and ask them. And another student can come by and answer their questions."

Putting Students In Charge of Graffiti Discussion

When we first started graffiti discussions I acted as the sole facilitator—answering questions, monitoring the quality of ideas added to the board and tracking participation. I recently surrendered this facilitation to students. What an idea! Now, students sign up to play the roles of Conversation Captain and Conversation Tracker. These two students, excluded from the day's reading (which they make up at a later time), run the show.

The Conversation Captain checks the ideas of their classmates, which they have written in their journals, before they are added to the wall. Is the idea clear? If not, the Conversation Captain provides suggestions or asks questions to nurture the development of the idea. This helps our graffiti discussion steer away from one-word contributions. Before we implemented this safe-guard "Cool!" and "Yes" were popular comments. The Conversation Captain also helps direct students to threads that relate to their idea. The Conversation Tracker tallies the students' participation in the graffiti discussion, marking the names of participants and noting the type of ideas added. At the end of the graffiti discussion, the Conversation Tracker gives a report summarizing the day's activity and recognizing students who went above and beyond in their participation.

The addition of these roles has helped free me up to provide help for struggling students and has boosted student participation. While one might worry that students would strive for quantity over quality, the student-facilitated discussions have been just as deep and insightful as when I facilitated them.

How Do You Conclude A Graffiti Discussion?

When I first used graffiti discussions, I struggled to find ways to conclude the activity. We were often left hanging with an amazing cluster of ideas on the class whiteboard that didn't seem to resolve. Over the course of this school year, I experimented with several conclusion activities.

1. Graffiti Discussion Journal Response
At the suggestion of my graduate school mentor, I developed a protocol

for journaling in response to ideas within the graffiti discussion. During the last 10 minutes of the activity, students browse the ideas we've generated, pick a "bright spot" to celebrate and write a response in their journal. A "bright spot" is a thought-provoking question or a strong idea worth celebrating. After journaling, a few students choose to read their entry aloud.

2. Bright Spot Discussion

I often use a variant of the journal writing to conclude a graffiti discussion, which involves an oral recap of the activity. I begin by asking the Conversation Tracker to share out the day's stats, and then to facilitate a discussion with their classmates. We look for four students to share out "bright spots" in our graffiti discussion. Here's an example of a bright spot that was shared. This thread helped answer a student's question and sparked a personal connection:

(Students responded to a moment when the protagonists emerge from the underground and see the night sky for the first time)
Question: What are the glowing things in the sky?
Answer #1: Stars.
Answer #2: Stars. The book describes them as little specks of light and they looked like salt.
Quote & Connection: "He was smiling & crying. She realized she was too." We took my neighbor to my dad's concert yesterday. She was so excited because she never gets to go out. At the end of the concert she was smiling and crying so much because she was so moved by the music and was thankful for our invitation.

Identifying these types of contributions together helps provide models for future graffiti discussions. These examples push students to try new things and move towards an increasingly connected discussion. Plus, students love to be recognized for their "bright spots." When another student or a teacher celebrates a third student's writing to the class, you can feel the love in the room.

3. Choose a Prompt for Tomorrow's Warm-Up

Sometimes I am reluctant to end an engaging graffiti discussion to make time for journaling or a bright spot discussion. In these cases, I take photographs of the writing on the board. I then choose one or more ideas for a prompt in the next day's journal warm-up, which I project

onto the screen at the beginning of class. This is a good way to revisit crucial ideas from the previous day's discussion before continuing with the reading. Students also love to see their writing displayed for all to see and used as a prompt for their classmates. I make sure to give them credit for creating the warm-up.

Reflections on Graffiti Discussion

Throughout the two years I've used this approach to literature discussions, I've seen remarkable improvements in the quantity and quality of student participation, not to mention the sense of ownership felt by my students. Engagement was heightened simply by the use of expo-markers on the whiteboard and the opportunity to move around. Many students remarked on how much more fun it was to write on the wall than in a journal. The activity also provides students with an audience for their writing, which motivates many of them. I've seen many students who self-identify as non-readers emerge as huge enthusiasts of graffiti discussion.

Students also experience a reduction in anxiety throughout the activity. Silently writing amidst a group of students seems less daunting than raising your hand and speaking in front of the whole class. One student pointed this out when she remarked, "You can hear everybody's voice. Some people are afraid to raise their hand in front of the class because they think it's not a good idea. But, on the board, you can write it down and it can actually be good." As a result, those quieter voices that are often lost in whole-class discussions begin to emerge.

Furthermore, graffiti discussions automatically differentiate for a variety of learners. Students are able to read the board and contribute when they are ready, which helps them to develop their ideas and makes sharing safer (much like a pair share or pre-writing exercise). The low-volume nature of the activity also helps students concentrate on their reading and their ideas.

Ultimately, what I love about graffiti discussions is seeing the control within my classroom shift from teacher to students. Traditionally, the class novel read-aloud and lecture is a teacher-centered affair. Students depend on a teacher to ask questions and illuminate meaning from the text. With graffiti discussions, I see my students undertaking these

tasks with confidence. Students ask the questions, answer them, find themes and symbolism in the text and help one another to understand the story more deeply. Graffiti discussions have shown me that when students make the shift from "doing" a process to "owning" a process, they can transcend our wildest expectations, and their own.

To learn more about Graffiti Discussions or other work that Bobby and his class are doing, visit Bobby's digital portfolio at: https://sites.google.com/a/hightechhigh.org/mr-shaddox-6th-grade-humanities/

Let's Give a Hand to the School of the Future

Cindy Jenson-Elliott
2012 Fellow, San Diego Area Writing Project

Learning is experience. Everything else is just information.
—Albert Einstein

Last winter, during our rainy season when the clay soil was wet, I began digging a broad, shallow hole in my backyard as a base for a patio. The problem was, I didn't know what to do with all the dirt that came out of the hole. There was a LOT of it! After hauling a few wheelbarrows full of clay to the back end of the yard, I realized that wherever that dirt went, it would stay. I did not want to dig it up and lug it around more than once.

As I began to brainstorm where I could put the rest of the dirt, my daughter squealed—"Don't get rid of it! I've always wanted a dirt pile!" Who knew?

In a trice her shoes were off, her pants rolled up, and she was happily knee-deep in dirt, digging, smoothing, shaping, playing. My daughter was doing what children do best, celebrating her senses, connecting with the earth, learning with her whole body.

Contrast this with another "kid-friendly" experience we recently had. I took my children to Disneyland to see Innoventions' "House of the Future" in Tomorrowland. I have seen this exhibit a few times over the last 20 years, but this time the Tomorrowland vision of the future really worried me. The house was certainly beautiful—much cleaner than my own home, and better furnished. But the world of tomorrow, as envisioned by Disney, was missing the thing I value most—sensory experience. It got me thinking about the "Classroom of the Future" and what it might be like. And it got me scared. The House of the Future featured a world without touch. Hands-free, with a brilliant, built-in virtual friend.

"Meet Lillian!" a chirpy salesman said. "Say hello, Lillian!" A high-pitched feminine voice filled the room. "Hello. How may I help you today?" A shiver went down my spine.

"Lillian, I need a kid-friendly recipe for dessert," the salesman said. Instantly, the kitchen counter began to glow, and a recipe appeared, as if on a computer screen. "Can you check the cupboard to see if we have the ingredients for it, Lillian?" Lillian said, "You are missing brownie mix."

The salesman turned to my daughter. "How about that?" Then he said quietly, "Are you thirsty?" My daughter nodded. "Watch this!" He spoke louder. "Lillian, turn on the water." Water began to flow from the faucet. "Lillian, turn off the water." The water stopped. "Cool, huh?"

My daughter reached for the water. "Oh, no," the man shook his head. "I wouldn't touch that. It's recycled." Don't. Touch.

Life's most pleasurable, hands-on experiences – playing with water, cooking — taken out of our hands and homes and given to a computer. If this is the house of the future, what will happen in our classrooms, our play spaces, the world at large?

The Importance of Hands-On Learning

Many people fondly remember some kind of hands-on, multi-sensory play in kindergarten or preschool—playing with play dough, splashing in a water table, building with blocks. According to Dr. Aric Sigman, a British neuroscientist and fellow of the Royal Society of Medicine, such sensory play needs to continue beyond the preschool years. And not just for fun and games: hands-on experiences are essential for neurological development. Hands-on, sensory experiences help the brain make vital connections between mirror neurons, the brain cells that enable us to understand and copy another's movements—the very basis, Sigman says, of social and cultural education and intelligence. Autism is one example of what can happen when mirror neurons do not function properly.

The importance of the hand-brain connection can be seen early in fetal development, according to Dr. Sigman: "…nerve connections from the hands to the brain develop before the connections that allow the brain to control the hands. It is now believed that the fetus's hand movements and thumb-sucking, far from being controlled by the brain, may actually wire the brain" (Sigman, 2006). In other words, it's not our head that makes us smart; it's our hands.

Frank Wilson, author of The Hand and a neurologist at Stanford University School of Medicine, studies the connection between the hand and the brain. "We've been sold a bill of goods," he says, "about how valuable computer-based experience is. We are creatures identified by what we do with our hands," (as cited in Louv, 2005, p. 67) and much of what we learn—and can learn—comes to us from what we do and feel with our sense of touch.

Primary Experience Versus Mediated Experience

In Last Child in the Woods: Saving Our Children from Nature Deficit Disorder, author Richard Louv celebrates the importance of what education gurus John Dewey and Edward Reed called primary experience—"that which we can see feel, taste, hear, or smell for ourselves" (as cited in Louv, p. 65). When a child learns through their senses, they construct their own knowledge from that experience – no one else decides what they have learned from it. Long ago, Dewey

warned of the danger of replacing primary experiences with secondary experiences mediated by an outside authority.

Robin Moore, professor at North Carolina State University, warns that this outside authority takes a new form today in our society—electronic media. Multi-sensory experiences, he says, are being replaced by the "secondary, vicarious, often distorted, dual sensory (vision and sound only) one-way experience of television and other electronic media" (as cited in Louv, 2005, p. 66).

The increase in screen-based recreation and learning is having a testable effect on children's understanding of the world. In one ongoing test of key cognitive developmental markers, researchers tested 10,000 British school children's abilities to compare and estimate volumes of liquids in different-sized containers and the weights of objects of different shapes and sizes. This kind of visceral, body-based knowledge—having a "feel" for the physical world—forms the basis of our understanding of science and math among other things. The results astonished the scientists. Eleven-year-olds today had similar scores to eight-year-olds 30 years ago. Researchers attribute this deficit in cognitive and conceptual development to the increase in virtual learning and screen time, and the lack of hands-on experiences (Varlas, 2008).

The Folly of Technophilia

If hands-on, multi-dimensional, sensory learning is so beneficial to brain development, what is the role of technology in education? Educational institutions, like the rest of society, are obsessed with technology. In classrooms all over the country, teachers, parents, administrators and students are placing their faith in expensive, high tech tools to ensure learning and bring up test scores.

The change from hands-on experiential learning to high-tech virtual learning has been marked in many school districts. In the Kyrene School District in Tempe, Arizona, for example, while technology budgets have grown exponentially, "the rest of the district's budget has shrunk, leading to bigger classes and fewer periods of music art and physical education," (Richtel, 2011) according to an article in the New York Times. In short, hands-on, multi-sensory learning has lost ground to high tech, screen-based learning.

Part of this change may have come about because of commerce. Technology companies have sales reps. The dirt pile in the corner does not. Tech sales reps present their goods and services to school boards and district administrators with slick advertising campaigns and pitches promising the holy grail of high test scores. According to the New York Times, "This is big business. Sales of computer software to schools for classroom use were $1.89 billion in 2010. Spending on hardware is more difficult to measure, researchers say, but some put the figure at five times that amount" (Richtel, 2011).

In addition, high tech, hands-off classrooms promise to free-up teachers to work with even more students. Thus, in many districts, more tech means larger classes. And larger class sizes means less direct teacher-student contact. To school administrators, spending on technology can sound an awful lot like saving money on salaries.

But high spending on high technology may not be able to deliver the improved test scores salespeople promise. The New York Times reports on the findings of Randy Yerrick, associate dean of educational technology at the University of Buffalo to say that "…the research, what little there is of it, does not establish a clear link between computer-inspired engagement and learning" (Richtel, 2011).

Studies have not revealed a connection between spending on technology and improved test scores. In the Kyrene School District, superintendent David K. Schauer told the New York Times, "My gut is telling me we've had growth…but we have to have some measure that is valid, and we don't have that" (Richtel, 2011).

Don't get me wrong—I LOVE what the tools of tech bring to the classroom. It's hard to imagine teaching in the classroom I grew up in, without access to the internet for research, email for communication, Google Earth for geography, and communication and authoring tools such as blogs, twitter, web pages and video to get our messages across. But hands-on learning must not be lost in our eagerness to embrace technology. In the classroom and on the playground, we must provide opportunities for kinesthetic, multi-sensory engagement—the modalities that wake up kids' brains give them a "feel" for the physical world, and help them learn with their whole bodies.

De-constructing Play Spaces—and Re-constructing the Outdoors as a Multi-Sensory Hands-On Learning Lab

If kids are immersed in technology in the classroom and at home, the best thing we can do for them is provide time and space for multi-sensory learning to take place at school and in the community. One way to do this is to deconstruct playgrounds.

American playgrounds have transformed in the past thirty years. Gone are vacant lots filled with trees for climbing, streams for wading, wildflowers for picking, sticks for making forts –those dirty, messy, wet activities. Gone are merry-go-rounds for spinning out of control, and in many communities, even swings for touching the sky – those risky, dangerous toys. A cadre of companies, adult architects, and regulatory sentinels have descended on children's play spaces and sucked the very life—and learning—out of them.

When my son was four, he loved playing around the roots of a giant sycamore tree that shaded his school playground. Then one day, the sycamore was cut down and replaced by metal bars holding a triangular cloth shade. Sure, it was an attractive and well-built structure. But it was not alive. It was not a tree. The preschool had been forced to cut down the tree because the law stated that branches could not be within a six -foot reach of a child with 2 foot long arms. They might use their hands to grasp, their legs to jump, their bodies to climb to the stars. Someone could fall and get hurt. Someone could sue.

The Public Playground Safety Handbook, put out by the federal government, offers 60 pages of regulations and suggestions about how to turn on fun hands-on play spaces into a safe zones of static sterility. The pages feature pictures of familiar climbing structures, tube slides, rubber mats and metal bars.

Metal bars. When children have interacted with such a play space once or twice, they lose interest. There is no challenge, no surprise , no purpose in such a play experience. The structures are immobile. They can't be changed to suit a child's fancy, pushed and pulled into place, transformed with a child's imagination. Children can't get a feel for the world if they can't manipulate it with their hands.

Consider instead, play spaces that have sprung up throughout Europe called Adventure Playgrounds. Adventure Playgrounds are play spaces that provide surprising, changing and challenging experiences. Adventure Playgrounds invite children's decision-making, encourage reasonable risks that build skills and confidence, and allow children to build and create. They can involve water and wood, dirt and plants, tools and tires—and most of all, imagination.

In Adventure Playgrounds, children build structures and take them apart, they dig in the dirt and splash in water. They climb ropes and trees and make forts in the bushes. Adventure Playgrounds are playgrounds for hands. The only remaining Adventure Playground in the United States is in Berkeley, California has the only remaining Adventure Playground (www.ci.berkeley.ca.us/adventureplayground/).

Part of what make Adventure Playgrounds breeding grounds for primary experience is that they often include elements of nature. But a play space does not have to be a certified "Adventure Playground" to include natural elements. In fact, any school playground, backyard or park could be transformed into a multi-sensory learning environment through a few key changes.

Redesigning Playgrounds

The Institute for Nature in Childhood, a nonprofit organization which sprang up to help reconnect children with nature and repair what has been dubbed "Nature-Deficit Disorder," (Louv, 2005, p. 1) recommends that the following elements—with a few additions by this author—be present in any hands-on outdoor play space (Finch, 2009).

- Water elements: hose, faucet, sprinklers, rain barrel, hand pump, or spray bottles
- Water transport: plastic pipes, watering cans, plastic jars, jugs, bamboo poles
- Sand, mixed with water or dry
- Dirt pile, the bigger, the better
- Digging pit: a place to dig around and build up
- Logs and stumps for balancing, sitting, hiding, rolling, jumping and building

- Rocks and boulders for jumping and climbing on
- Paths for meandering
- Hammocks or other places to sit and rock and dream
- A flat surface and materials for outdoor art—painting, sculpting, weaving,
- A garden: grow flowers, vegetables and other things that smell and taste good
- Tunnels to go in and under, made of a pipe, or of vines or willow branches draped over a structure
- Play stream and a rain garden: a cobblestone place for water to run down hill and into a garden
- Discovery board: a piece of plywood 2 x 2 feet. Place on the ground and leave it for a day or two, and see what is hiding underneath—slugs, pillbugs and more!
- Loose parts for Outdoor Construction Play: small logs, branches, boards. Sand edges to avoid splinters. Add tarps, twine, blankets, cardboard for building and you have your own adventure playground!

Each of these elements allows children to use not only their hands, but also their whole body and senses to discover the world, construct meaning, and learn. A play-space like this would be both an antidote, and an essential addition, to a high tech classroom.

Transforming a schoolyard into an adventure-playground-like space—including hands-on opportunities to take appropriate risks—doesn't need to involve expensive or radical changes. The introduction of logs and stumps for balancing, leaping and sitting would be a simple place to start. Or perhaps bringing in palm fronds or branches for building forts, or small rocks and a pile of dirt for making fairy houses. Each year, a few elements could be added—dirt one year, water another—natural elements that require thinking, doing, imagining, incorporated one by one.

Conclusion

In our backyard, my daughter and her friends have moved beyond the dirt pile and have taken possession of a home beneath an Indian Hawthorne bush. It is a cozy hollow. In spring it is roofed in pink flowers. The fine, leafy flooring includes a few pokey blackberry

brambles. The children press down an old sleeping bag as a rug. They bring books, plates of crackers, lemonade and set up shop on an old stump. This is where they play house, grind gelatinous berry-leaf-mud-water concoctions on a flat rock, read and sing to sick dolls. It is a perfect house of the future, filled with friends, smells, feelings both prickly and soft. It is a world that appeals to all the senses, requires the eyes to focus near and far, allows for experiences of over and under, wet and dry, in and out, dark and light, heavy and weightless. It is a house for doing. A house of hands that feel and touch, learn and hold. It gives me great hope for the future.

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To learn more about turning school yards and playgrounds into places of exploration, see www.natureexplore.org

For information on Berkeley, California's Adventure playground, see their website at www.ci.berkeley.ca.us/adventureplayground/

Hoisting a log to be cut at the sawmill, photo courtesy of UCDS

Finding Inspiration Down the Hall and Beyond the Walls

Katie Morrison and Matt Swanson
University Child Development School, Seattle, WA

At University Child Development School, UCDS, preschool through fifth grade students attend classes in seven specialty areas in addition to core academic subjects in their classrooms. These areas are: Art, Library, Music, Physical Education, Science, Spanish and Technology and Design, and collectively the teachers of these programs are called "the Specialists." These teachers draw on their areas of expertise and interest to build an engaging and innovative curriculum for students. While the school schedule has separate boxes for each specialist class, in reality it is impossible to contain the disciplines in this way. For example, a song learned in Music class takes on new meaning when the cultural tradition behind the song is uncovered in Spanish class. Though it is tempting to isolate each subject for ease of planning—allowing for a "divide and conquer" approach to curriculum design—we have found it worth the extra effort to build connections between our programs and draw inspiration from the passion and expertise of our colleagues. This culture of collaboration, united around a school-wide theme that we choose each year, is the driving force behind our interdisciplinary curriculum.

For students, engaging in one topic through multiple disciplines facilitates the kind of integrated thinking that is crucial in today's interconnected world. Strengthening ties between specialty areas allows students to access knowledge through different pathways and gives them multi-sided tools to solve complex problems. We have observed a positive feedback loop when we merge our curricula. For example, during the year themed Vision, students experienced "Ah Ha" moments when they applied principles of light and optics they had learned in Science to glasswork they were creating in Art. Each new window into a topic reinforces the skills developed in other areas, and as students move along an interdisciplinary thread they realize that they've begun to think "like the experts." While they certainly haven't covered every content area, they have uncovered the kind of in-depth and connected thinking that is necessary to push a field forward.

For the teachers, collaboration has become the fire that fuels some of our most exciting curricular developments. Here we describe two examples that demonstrate how specialist teachers have come together and highlight the processes, insights and curricula that have emerged as a result.

From Mill to Music

One year, during the school-wide theme Quest, teachers launched a yearlong exploration of guitars with the 4th and 5th grade students. This project brought together Music, Technology, a local sawmill and a luthier (stringed instrument builder). It began in the Specialists' team conversations before the start of the school year, where Ben Chickadel (Technology and Design) and Matt Swanson (Music) shared their ideas for the year. Ben hoped to explore the quest from raw materials to finished products, and Matt was interested in leading students in a quest to understand how various instruments produce sound. Ben had come across a plan for a build-your-own cigar box guitar in Make magazine, and this was the spark that revealed the potential for collaboration.

They initially envisioned a fairly simple, short-term collaboration, but as new avenues for exploration kept opening up, the scope of the project kept growing. Instead of using pre-made materials and following the prescribed process in the magazine, they decided to take a more comprehensive, holistic approach, which led them right to the

very source of the materials: a local saw mill.

At the mill, students were captivated as they hoisted logs in the air and watched the powerful saw shape former trees into guitar necks. Back at school, classes tested the resonance of the cigar boxes that would later become guitar bodies and used Google SketchUp to plan how all of the pieces would fit together. To bring these designs to fruition students used tools such as saws, drills, hammers and less tangible tools like mathematical and spatial reasoning. Grappling with complex fractional equations, one student remarked "I'm not sure if I'm in Math, Music or Technology right now!"

Coordinating the steps of the project required a great deal of planning and conversation between Ben and Matt. "In the beginning, once we realized the scope of the project, we talked whenever we could find time—at lunch, between classes, after school. We needed longer sessions to plan out where to start and where to go. But as the project rolled along, there was a natural sequence to it," reflected Ben. And, as Matt added, "Each new step presented unique challenges—we had to keep reassessing the timeframe and direction of the project." Managing these curricular pieces involved frequent, sometimes daily, check-ins.

With the basic shape of the guitars cut and ready, classes took a field trip across the street to visit a guitar-builder in action. Luthier Aaron Andrews explained his process for making various types of guitars and highlighted the different types of materials and tools he used. He then cut the fret slots into the students' guitar necks—a step requiring specialized tools and a degree of precision that Ben and Matt decided was best left to a professional! Back at school, classes worked through the remaining steps, becoming experts in the specific vocabulary of the trade: notching and gluing necks into bodies, cutting bridges and nuts out of found plastic materials, cutting and filing fret wire and installing tuning pegs. They even built, tested and installed piezo pick-ups so that the guitars could be amplified.

Along the way, there were some logistical obstacles that had to be addressed. Ben remembers, "Sometimes we had to split up the project, and parts were completed either in Music class or Technology class. A few times we had to adjust the schedule and all meet and work together. For the cutting and sawing parts of the project we had to find

a space out of the Tech lab where we could do that!" Coordinating field trips with classroom teachers, checking with other specialist teachers to make occasional schedule changes, and finding materials and spaces for the project were challenges that had to be overcome in order to keep the project moving.

The whole process came to fruition just as classes were gearing up for the spring musical performance, and eight students took to the stage with the guitars they had made. As the "guitarchestra" performed a rousing rendition of "On the Road Again," the crowd marveled at the sound of these handmade instruments. In Music class students spent the rest of the spring playing the guitars, learning chords and basic technique. As the 4th and 5th graders built their set of musical skills, it was evident just how much they had taken from this project. They understood, profoundly, the inner workings of the instruments, and when something broke they knew just what was needed to fix it. They experienced first-hand the quest from raw materials to sophisticated musical instruments so they appreciated the interconnected nature of music, technology, math and product design. And finally, they invested indelibly in a set of instruments that became part of the school's music collection.

photo courtesy of UCDS

The experience not only facilitated student learning, but also prompted growth and learning on the part of the teachers. Over the year, Matt and Ben experienced how each of their programs was strengthened by removing the division between disciplines through authentic collaboration. In addition, they each were able to learn from the other about the technical and logistical pieces of the project itself. Ben reflected, "I knew I could approach this project in a technical/design way, but I had to learn so much about sound and how a guitar works. I didn't know anything about that!" Though Matt understood how a guitar was supposed to feel and sound, he had never considered all the technical details of creating one from scratch. By necessity, both teachers learned tremendously from the expertise of the other. They also gained an appreciation for the importance of flexibility in scheduling for a project like this—though they had initially envisioned a straightforward, couple month-long process, the emergent possibilities caused the project to balloon into a full year investigation.

The legacy of the guitars lives on at the school, where they hang on a display wall next to the front office. They are still used for musical pursuits of all kinds, and they also function as a reminder of the opportunities presented by interdisciplinary, collaborative teaching

Up, Up, and Away

It is a blustery day on the playground at UCDS and first and second grade student scientists are cheering for the wind to blow even harder. They are using handheld anemometers to record wind speed, analyzing the various designs of these instruments for accuracy and ease of use. Later in the year they will choose the best anemometers for testing windmill blades they have designed in Technology class, and weeks earlier these same students experienced the sensations of the wind as they soared self-portrait kites from Art class high in the sky.

In this collaborative example, the school-wide theme of Design and the topic of wind were the common thread that bound together these interdisciplinary projects. We were initially inspired by the students' classroom read-aloud Windblowne, a story of a young boy Oliver and his kite-flying adventures. Before the school year started, the Specialists brainstormed how our separate curricula could weave together concepts, skills and processes that could tie into this captivating story. Kites, wind and renewable energy kept coming up

in our conversations and the Art, Science and Technology and Design teachers all developed curricula around these themes. While we each had specific plans for our program of study, the common topics and concepts kept us conversing and learning about these subjects together. In these vignettes, we describe how first and second grade students were swept up in a cross-curricular study of wind and weather in Art, Science and Technology and Design classes.

In the Science Lab, students spent several weeks investigating the properties of air and the principles of convection. They explored the design of six different anemometers, examining their form and function and testing them in and out of the lab. A collaboration with a local scientist also added depth to our project. Meteorologist Kristina Katsaros shared equipment and brought to life her experiences as a weather scientist and engineer: living on National Oceanic and Atmospheric Administration (NOAA) ships, simulating wind, rain and ocean interactions in the laboratory, and even flying into a hurricane!

Meanwhile in the Technology Lab, students immersed themselves in a yearlong project on wind and renewable energy. Focusing on wind turbines, students used computers to design and simulate tests for wind generator blades. Each student created a set of unique propellers and measured the voltage output—enough to light an LED. During this project, tools and terms explored in the Science lab were revisited in Technology, while the project in Technology added application and meaning to the concept studies happening in Science. The crossover also greatly benefited the teachers as we shared resources, equipment and insight for topics new to us in this investigation. The side-by-side placement of the Science and Technology labs made it easy to serve as each other's sounding boards for ideas and curriculum.

In the Art Studio, the year took flight with students designing and building self-portrait kites and overcoming the challenges of aligning a self-portrait with the parts of a working kite. Art teacher Jessica Garrick reflected, "In collaboration with the Drachen Foundation, an organization whose mission is to increase the knowledge of kites worldwide, we designed kites, the shapes of which would accommodate full body self-portraits but which would also function as flying kites. An important aspect of the project for us was allowing the students to express how they saw themselves with drawing and painting on the sails of the kite." On a culminating field trip to a local park, students

flew their kites high in the sky. As they sketched each other's kites, they noticed the contrast of their creations against the backdrop of clouds and color. "We were all so excited to see these huge self portrait kites soar in the sky. It was the perfect day and the kites looked amazing against the blue sky and clouds." These observations inspired their next study in Art—skyscapes, with students using oil pastels and watercolors to create resist paintings. They then worked with Jessica and expeditionary artist Maria Coryell-Martin to create watercolor cloudscapes.

Student getting ready to launch a self-portrait kite, photo courtesy of UCDS

Science teacher Katie Morrison reflected, "One day at lunch Jessica started talking about the skyscapes project and I immediately thought—Oh, I want to study clouds in science! This kind of thing happens again and again. You hear about something a colleague is doing with students and think, that sounds really cool, I want to join in. The key is to head down the hall and have those informal chats about curriculum and teaching. Ask, what's happening in your classroom?"

Back in the Science lab and inspired by the skyscapes, students learned

the names and Latin roots of clouds, how to identify different cloud types, how to determine opacity, and how to estimate cloud cover. Students submitted their observations and data to NASA's Students Cloud Observations Online (S'COOL) program. Observation skills and cloud terminology were reinforced in Science and Art as students explored clouds and weather from multiple perspectives. For the teachers, we were inspired by each other's work and our conversations led to new teaching opportunities.

While each project in Art, Science and Technology could have stood alone as an interesting investigation of design, weather and wind, together they harnessed the energy of collaboration and the benefits for students and teachers of exploring a topic through multiple perspectives and disciplines.

Lessons Learned

From these experiences, as well countless other projects, we carry forward some important lessons. The crucial ingredient is a willingness to start fresh each year and consider new opportunities for exploring each discipline through different lenses—it is always exciting to see where the new theme and new school year will take us. We have also found that it is difficult to initially map out every detail for projects of this magnitude—rather it is beneficial to let the projects unfold in response to student learning, teacher collaboration and out-of-school resources. Flexibility in scheduling is another important component to successful collaborations. Our schedule is a complex array of classes that don't always match up with each other; we each teach multiple levels in the school for varying amounts of time and differing numbers of weekly classes. However, when opportunities arise for combined classes, field trips or special projects we let go of these boxes and are grateful for the flexibility of our colleagues whose schedules are also impacted. Successful collaborations require flexibility in planning as well, adjusting the curriculum to coordinate with our partner's, while also keeping in mind the specific needs of our own program. At times it can also be necessary to let go and proceed in our own direction when the timing or direction of the project doesn't work out.

Lastly, frequent conversations are central to successful partnerships, as these facilitate consistencies in student experiences and enable the reinforcement of concepts and ideas across subject areas. These

collaborative discussions revolve around big picture ideas such as themes, project directions and learning outcomes, as well as the nuts and bolts of a project such as tools, materials and terminology. While our collaborations are certainly facilitated by weekly meetings of the Specialist team, it is the casual conversations in the hallway, lunchroom and after school that often spark the most interesting projects. Creating and sustaining a culture of interaction between teachers, such that the activity in each room becomes the interest of everyone, is really what allows these conversations to happen.

Collaborations can be a tight knit plan where two curricula are linked and sewn together, each depending on the others' progress to move forward. Other times, they are strung together by a common thread or idea, each flowing freely like a kite tail but also building on one another and each adding a layer of depth to the concept study. Either form is inspiring to teachers and students alike!

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To learn more about University Child Development School, visit: http://www.ucds.org/

photo courtesy of Creative Partnerships

The Problem Finders: Designing for Great Learning

Ewan McIntosh
Edinburgh, Scotland

Project-based learning is hugely popular around the world as a means of engaging students more deeply with their learning. Yet, the various flavours of project-based learning—problem-based learning, challenge-based learning, enquiry-based learning, Montessori, Reggio Emilia—typically involve a teacher designing open-ended questions or problems for students to solve. Cultivating problem-solvers is important. Much more vital is the capacity for ambitious learners to find deep, interesting and important problems to solve for themselves. How then might we design projects that support students in becoming problem finders?

This is not a new challenge. Boston-based educator Alan November told me a story about his Community Problem Solving course. On the first day, he gave students the task of finding a problem in the local community that they would then solve using whatever technology they had available. From the front row a hand shot up. "Mr November?" began one of the girls in the class. "You're the teacher, we're the students. It's your job to come up with the problems and give them to us to solve." This was 1983, but it could have happened in most

schools today.

In contrast, at Rosendale Primary School in London, an increasing number of students are responsible for choosing what they learn, how they learn it and when they go about it. Rather than waiting for the teacher to provide problems to solve, students here have to find the juicy problems they want to explore, within a given theme.

This exploration often begins with an Immersion Box—a set of physical artefacts, digital resources and experiences provided by the teacher and designed to stimulate curiosity. From there, it's up to the students. Through the use of questioning and ideation techniques, students are asked to produce higher order questions around the content about which they are passionate—"un-Googleable" questions that open up learning-rich tangents. For example, while exploring the theme of London is Full: Evacuate! students analyzed old maps and archived news clippings, interviewed relatives, planned field trips, and used the internet to learn about population growth, living conditions and overcrowding, as well as the water cycle.

During this time, the teacher rarely taught to the whole class. She did, however, have one-on-one conferences with every student at least once a week, sometimes more, to see where they were at in their learning, and where they were headed.

In any number of nearby schools, most students would be following almost identical paths through bodies of knowledge, each creating all-too-similar products of learning at the end of the process. However, none of these Rosendale students follow the same route to the same learning conclusions. There is, arguably, too much information for one student to ever consider, so they have to self-organize and teach each other what they find, decide what's relevant and think about what it all means.

The key difference in this approach is who asks the questions. One aim of Rosendale's learning approach is that students design their own essential questions, which they then explore. The results can be felt and heard. When we look at this learning approach in action, we see highly empowered children who know what and why they're learning, where they've been on their learning journey and where they're headed next.

These three elements are the foundation of solid formative assessment, the mental toolset that enables students to own their own learning (Wiliam, 2001). For example, Rosendale students log their learning moments on Evernote in video, audio, photo or text notes. Learning to recognize when they've had a learning moment is, in the beginning, a new sensation for the learners. It's a skill that needs to be taught, not caught. "Guide on the side" is an apt description of a teacher in this environment.

What Makes Learning Great?

Fundamental to what makes great learning are what English researcher Guy Claxton calls "The Three Rs and The Three Cs" (Claxton, 2008). Within this framework, students want:

- **Responsibility** for their own learning, and their assessment of where they are in their learning.
- **Respect** for the learning paths they choose to undertake. Nothing deflates a learner more than a "that's interesting, dear, but how about this way…?" response to their idea.
- **Real things** to sink their teeth into, not the fake pseudo-problems criticized by people like mathematics teacher and blogger Dan Meyer and the Thanks Textbooks blog.
- **Challenge** in the tasks that they undertake, which means that the tasks are open-ended and designed to engage each student in their zone of proximal development.
- **Collaboration,** particularly if the journey ahead is going to be a challenging one. Collaboration is not group work. Truly collaborative learning balances individual accountability with group outcomes.
- **Choice.** Sheena Iyengar's (2010) research over the past decade suggests that perhaps somewhere between 3-10 choices is perfect for your average human. Most schools, even those working with challenge-based learning or projects, struggle to provide students with choices in the way that they will approach their learning.

Design Thinking: A Framework for Rigorous Creative Learning

Design thinking provides a helpful framework and a common language for students, teachers and parents who are after great learning. This is not a surprise. For the past decade, I have worked with, invested in and built start-up companies in the technology, media and fashion

industries. Those who consistently come up with creative and successful ideas are those who explicitly or implicitly harness design thinking to find problems worth solving. I have also seen the use of design thinking lead to more engaged students and better academic performance, in elementary and high schools, in urban and suburban schools, in public and private schools.

Design thinking (Brown, 2009) begins with an immersion into a potential problem area—engaging in research, empathy studies, and observations, followed by a process of honing in on key problems to be solved. All this comes before any problem solving. Yet, in most schools, even those with a strong bias towards problem-based curricula, this is traditionally what the teacher still does for the student.

Once the problem is identified, design thinkers move on to the ideation, prototyping and feedback phases—coming up with ideas to solve the problem and rapidly creating possible solutions in order to gain feedback and begin the process again until they have a viable solution. In schools, students usually get one crack at having their idea come to fruition, and the teacher provides the feedback, normally with a final grade attached. In the real world, and through processes like Design Thinking, feedback is self- and peer-focused, continuous and affects the product of learning before it's "fully baked."

So, how can we support teachers and students in becoming design thinkers and problem finders?

"Forward-framing": Teachers Do It First

Over the past few years I've worked with groups of teachers in Brisbane and Sydney, Australia, exploring how their new national curriculum connects to the themes already on their school calendar, and which of these has the most potential for juicy problems (i.e. problems worth solving). We play on paper. We discuss which potential problems will work. We try them out in a prototype. These themes—ranging from sustainability to language making to scientific discovery—are vast, leading to an infinite number of problems for young people to find, frame and go about solving for themselves.

This is as much "planning" as is possible. Identifying the topic and resourcing experiences, artefacts and media is the largest task. As

the students' creativity drives the ideas and products of learning that follow, it's impossible for the teacher to plan in great detail what will be done when. Instead, we "forward frame"—we build a framework complete with activities, ideation and questioning techniques we know work well to help students' questions and learning grow around our frame.

The Framework in Practice

Having thought through each topic once as teachers, we're ready to let our students begin a similar journey, with a fair idea of where the learning might go, thanks to our forward-framing preparation and discussions. The trick here is to not let ideas from the planning bound what students will ultimately do. Students may come up with a problem we may not have anticipated, and it is the teacher's responsibility to encourage them to pursue those ideas too.

For example, one group of teachers allowed their seven-year-old students almost free rein to explore the theme of persuasive speaking and writing. They went on to build the world's youngest TEDxKids event. Students immersed themselves, as their teachers had, in over 200 TED talks, before turning their research and creative energy to solving some of the world's most pressing—or simply most interesting—problems: Do animals talk? Do babies have a secret language? Which cancer should we invest in curing first? Why do slugs needs slime?

Another group of students in a Brisbane primary school chose to explore living for 24 hours without technology, to immerse themselves not just in what makes technology so vital, but also the challenges and problems to our wellbeing that technology brings. From this starting point, the visceral, emotionally bound experience of living without their favourite gadgets, students arrived at higher order "non-Googleable" questions: Why might someone else think that living without electricity is a good thing? Can we write a set of instructions for the day that the electricity runs out? How would you improve our chances of not having brownouts and blackouts? If you could change one thing about Australia's energy policies what would it be?

In 2011, in the space of 21 days, we gathered over 10,000 young people online to generate solutions to the very problems that, thousands of miles away in Geneva, the (mostly) men in suits of the United Nations

were discussing. Young people didn't just come up with the ideas in isolation. Their questions, ideas and solutions were used live on stage at the UN, as provocations for the decision-making discussions about how much spectrum we should release to mobile phone users, or what we should do when the internet 'runs out' (interestingly, IPv4 addresses ran out late summer 2012).

Problem Finding in Schools

It takes courage for a teacher to let go of the reins of learning sufficiently to inspire problem finding where the questions are "Non-Googleable." No textbook, teacher or standardized test knows the answer. The teacher's voice is but one of 30, 300 or 3000 guiding, coaxing and coaching through the ether. Yet, this kind of learning surpasses the depth of thinking demanded by many of our more "traditional" modes. Design thinking engenders self-efficacy—the feeling that you can change the world around you, that you can make an impact. In the "real" world, high ambition, tight deadlines and impossible "wicked problems" frame many learning opportunities. So it should be in schools.

I began with a story about my friend Alan's class, where his students protested that "he was the teacher, and they were the students." After a year of problem-finding, those students insisted on the school opening up over the summer vacation so they could continue to find problems and solve them. When a new computer arrived, a student broke into school over the vacation—not to steal the computer, but to practice writing code. It's rare we hear of students breaking into school to learn. I guess that's what problem-finding does to people.

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For more examples of problem finding, design thinking and assessment for learning in action visit: edu.blogs.com or www.notosh.com

The Power of My Mistakes

Dan Wise
The Gary and Jerri-Ann Jacobs High Tech High

Very few of us are capable of responding to another's success with the same sensitivity and wholeheartedness that we extend to another person's failure . . . Responding to failure seems to bring out something good in us. It's not that we want other people to suffer; it's that we know better how to empathize with the person who is suffering than we do with the person who is succeeding.

—Richard Farson, Management of the Absurd

Upon coming to High Tech High, one of my biggest challenges was that I would ask my students to do something I hadn't done since I was in sixth grade: make art. Fortunately, one of my teaching partners was Jeff Robin. Jeff is not just a fantastic artist and teacher—he is also the school "whip," someone who pushes the school's mission both through his own work and through his (sometimes) solicited opinions. Fortunately, I was in the asking frame of mind. The best advice that he gave me, which I've heard him repeat many times since, is that I should do whatever work I expect my students to do first. His reasoning is that by doing the work yourself, you can provide a model, see any potential pitfalls, and see

how fun/educational it is to actually make the project. I haven't always followed his advice, but when I have, I have been better off, as have my students. Below I discuss three times in the past year when I have tried my own projects. In each case, I learned about how to present the project to students. I have also been embarrassed and pleasantly surprised by how much better my students' work was than my own.

History Boards: Opening Myself to Critique

For my project on authoritarian rulers, I divided students into groups, each of which would study a different authoritarian ruler in depth. At an early phase of the project, I asked students to create two-sided foam-board displays. On one side, students would write about the country before the person's rule, and on the other, they would discuss the ruler him or herself. For my model, I chose Saddam Hussein. I had read a lot about him over the summer in preparation for the project, and I was anxious for students to see the parallels between Iraq and their respective countries. To me, the most interesting aspect of Iraq was its borders, which brought together different ethnic groups that had historic rivalries. For my presentation, I compared three different maps of Iraq, and below each, I wrote a summary and analysis of what the borders said about Iraq and its national identity. The Photoshop process itself was informative—I hadn't used the program since I was in middle school—and I broke out construction paper for the first time in a long time. I hung up the result in my classroom.

Our little masters of critique immediately began giving me suggestions on my own model. I had enough good sense to turn it into an activity. I even allowed Jeff to come in and critique me in front of my students. The result is that, with the assignment sheet, I included a picture of my board and the following written underneath:

"On Friday, I asked for critiques from Jeff, Kai, Gabe, and some other students, and they offered these suggestions, all of which I thought were valid:

- *No title!? Shame on me!*
- *Each spot on the timeline should have a clearer label or title.*
- *The visuals did not match the story well enough.*
- *The pictures were too similar. Perhaps I should have moved the third (with the ethnic groups) over to replace the second (with the British borders).*

- *The pictures should have been in color.*
- *The colored construction paper may have been unnecessary.*
- *The display was awfully "boxy."*
- *The text could have been a little bigger.*

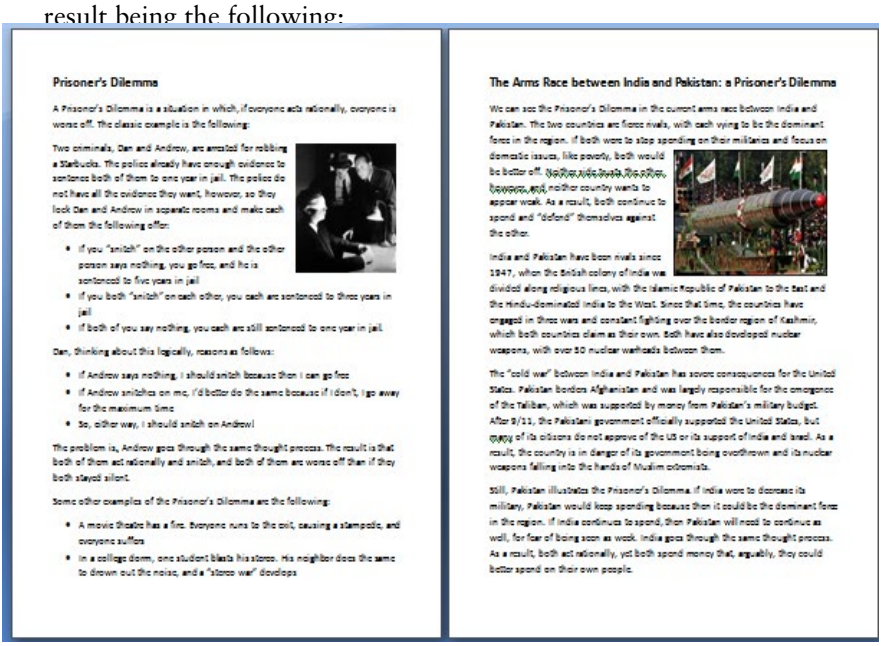
From this experience, I learned several things. First of all, I was impressed by the students' natural critiquing skills. They clearly had practice, and they were, for the most part, kind, specific, and helpful. I also learned the importance of putting myself in the students' shoes, not only in terms of doing the work but also in terms of subjecting myself to critique. It was a good bonding experience and a nice moment of shared empathy between me and my students. By the time the students created their own boards, they were almost universally

better than mine, with very few making the mistakes that I had.

Economics Illustrated: Shortcuts and Consequences

I knew from the time that I started at High Tech High that I wanted to have a project on Economics. I struggled coming up with a format, however, until two things happened. I saw Andrew Gloag's excellent *Absolute Zero* book, in which students illustrated different physics concepts, and I found out that Jeff planned to make linoleum block prints with my students. With these two teacher models, I came up with a format, in which students would each create two pages

of content. On one side, the student would describe an economic concept, providing a definition and examples, and on the other side, the student would write an article about a contemporary issue that could be better understood through their economic concept. For my model, I wrote about The Prisoner's Dilemma. In contrast to my work on the historical board, I went through several revisions myself, the result being the following:



Prisoner's Dilemma

A Prisoner's Dilemma is a situation in which, if everyone acts rationally, everyone is worse off. The classic example is the following:

Two criminals, Dan and Andrew, are arrested for robbing a Starbucks. The police already have enough evidence to sentence both of them to one year in jail. The police do not have all the evidence they want, however, so they lock Dan and Andrew in separate rooms and make each of them the following offer:

- if you "snitch" on the other person and the other person says nothing, you go free, and he is sentenced to five years in jail
- if you both "snitch" on each other, you each are sentenced to three years in jail
- if both of you say nothing, you each are still sentenced to one year in jail

Dan, thinking about this logically, reasons as follows:

- if Andrew says nothing, I should snitch because then I can go free
- if Andrew snitches on me, I'd better do the same because if I don't, I go away for the maximum time
- So, either way, I should snitch on Andrew!

The problem is, Andrew goes through the same thought process. The result is that both of them act rationally and snitch, and both of them are worse off than if they both stayed silent.

Some other examples of the Prisoner's Dilemma are the following:

- A movie theatre has a fire. Everyone runs to the exit, causing a stampede, and everyone suffers
- In a college dorm, one student blasts his stereo. His neighbor does the same to drown out the noise, and a "stereo war" develops

The Arms Race between India and Pakistan: a Prisoner's Dilemma

We can see the Prisoner's Dilemma in the current arms race between India and Pakistan. The two countries are fierce rivals, with each vying to be the dominant force in the region. If both were to stop spending on their militaries and focus on domestic issues, like poverty, both would be better off. Neither side trusts the other, however, and neither country wants to appear weak. As a result, both continue to spend and "defend" themselves against the other.

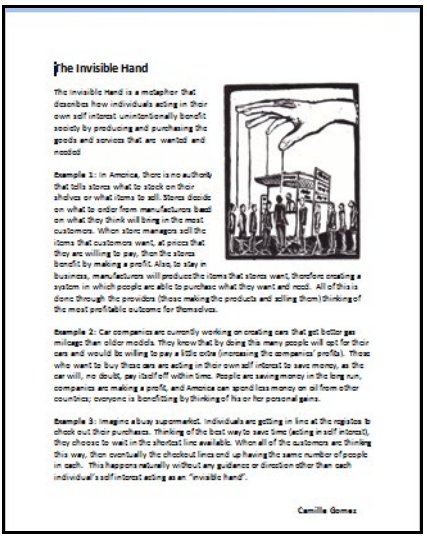
India and Pakistan have been rivals since 1947, when the British colony of India was divided along religious lines, with the Islamic Republic of Pakistan to the East and the Hindu-dominated India to the West. Since that time, the countries have engaged in three wars and constant fighting over the border region of Kashmir, which both countries claim as their own. Both have also developed nuclear weapons, with over 50 nuclear warheads between them.

The "cold war" between India and Pakistan has severe consequences for the United States. Pakistan borders Afghanistan and was largely responsible for the emergence of the Taliban, which was supported by money from Pakistan's military budget. After 9/11, the Pakistani government officially supported the United States, but many of its citizens do not approve of the US or its support of India and Israel. As a result, the country is in danger of its government being overthrown and its nuclear weapons falling into the hands of Muslim extremists.

Still, Pakistan illustrates the Prisoner's Dilemma. If India were to decrease its military, Pakistan would keep spending because then it could be the dominant force in the region. If India continues to spend, then Pakistan will need to continue as well, for fear of being seen as weak. India goes through the same thought process. As a result, both act rationally, yet both spend money that, arguably, they could better spend on their own people.

While I didn't mind the writing aspect (I am an English teacher, after all), I skimped on doing a linoleum block myself. I knew that Jeff provided models for the students and that he would be creating that aspect of the work. What I did not account for, however, was how much my model left out the "sexiness factor" of the art. I struggled to keep students motivated because, unlike me, they could not visualize the final product. It was only when I had a student model, print and all, that the mood of the class started to change.

The lesson for me in this was that shortcuts in creating models can defeat one's point. I had left out what I wanted to think of as "the easy part," but my failure to create it was ultimately a cop-out, one that cost me in student engagement. (Note: See image on next page. The student model is on the left, and the final product is on the right)



The Invisible Hand

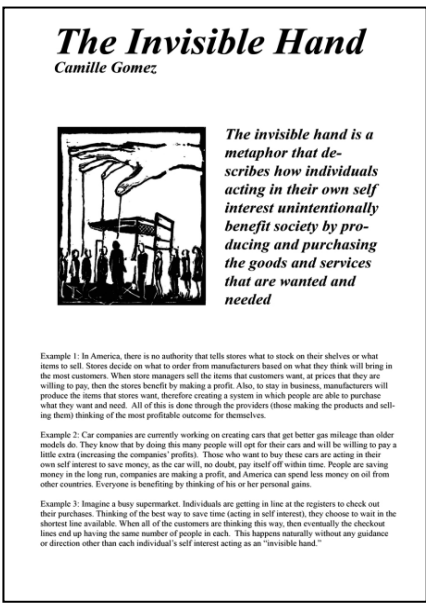
The invisible Hand is a metaphor that describes how individuals acting in their own self interest unintentionally benefit society by producing and purchasing the goods and services that are wanted and needed

Example 1: In America, there is no authority that tells stores what to stock on their shelves or what items to sell. Stores decide on what to order from manufacturers based on what they think will bring in the most customers. When store managers sell the items that customers want, at prices that they are willing to pay, then the stores benefit by making a profit. Also, to stay in business, manufacturers will produce the items that stores want, therefore creating a system in which people are able to purchase what they want and need. All of this is done through the providers (those making the products and selling them) thinking of the most profitable outcome for themselves.

Example 2: Car companies are currently working on creating cars that get better gas mileage than older models. They know that by doing this many people will opt for their cars and would be willing to pay a little extra (increasing the companies' profits). Those who want to buy these cars are acting in their own self interest to save money, as the car will, no doubt, pay itself off within time. People are saving money in the long run, companies are making a profit, and America can spend less money on oil from other countries; everyone is benefiting by thinking of his or her personal gains.

Example 3: Imagine a busy supermarket. Individuals are getting in line at the registers to check out their purchases. Thinking of the best way to save time (acting in self interest), they choose to wait in the shortest line available. When all of the customers are thinking this way, then eventually the checkout lines end up having the same number of people in each. This happens naturally without any guidance or direction other than each individual's self interest acting as an "invisible hand".

Camille Gomez



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Spray Paint Stencils: Lessons Learned?

Having (in theory) learned my lesson, I spent several weeks over the summer learning how to create spray paint stencils, which I wanted my first-semester students to do based on our class book *City of Glass* by Paul Auster. The previous semester, my students had painted my classroom's walls black, and I hoped to decorate without completely overhauling the room. I also wanted my students to write essays about imagery, and I needed a hook to keep them engaged. The plan, then, was for students to create a spray paint stencil of the image that they were studying-one that would accompany their essays.

For my model, I spent time re-learning Photoshop and playing with various media and image ideas. I tried using large sheets of plastic from which to cut out my images, but they were too unstable. I then tried old-school transparency film, but it wasn't big enough. Next I tried manilla folders, which were large enough but difficult to cut, especially in the middle. I finally settled on 110 lb card-stock. I realized that the card stock was easy to cut and that students could print their images directly on the card stock so that they would have an easier time cutting it out. Although this process took me a week of my summer, a destroyed shower curtain (over which I created the sprays), and a slightly pissed-off girlfriend, I had a plan.

I made mistakes choosing images as well. At first, I wanted to create a spray of Picasso's Don Quixote, but the lines were too thin, and the image had too many "islands." I eventually settled on an image of a pilgrim, modeled after Henry Dark, a character in the novel. Although the connection to a written image was a stretch, I had a model, which I sucessfully sprayed on card-stock.

The next step was figuring out how to spray on the walls. For my demo, I chose an image of a monkey that I thought would be fun to have on my back wall. This spray had several issues: first, I did it by myself, resulting in over-spray. I needed a better contraption to block the over and under-spray, which I eventually created with some old cardboard. I also held the spray paint too far away. Despite the instructions on the can and from sensible adults, by holding the can too far away, I made my room reek of overused spray-paint, and the white paint was dulled by the weak spray.

My final model, the one that I ultimately presented to my students, was of Humphrey Bogart (the image to the right). Although my students didn't see all the hard work and failures behind it, they benefited from not having to re-create my mistakes.

So, in sum, Jeff was right. In each of the above cases, my mistakes benefited my students. With the boards, I showed my flaws and built empathy; with the book, I lost student engagement for a time, making a mistake that I plan not to repeat; and with the sprays, I shielded my students from the vagaries and confusion that I struggled with at first.

To learn more about Dan's projects, visit https://sites.google.com/site/danwise/

The Politics of Assessment

Don Mackay
High Tech High International, San Diego

Assessments such as exhibitions and internships are intrinsically authentic but are few and far between. They embody choice, collaboration, and are formative in nature—all characteristics that I believe are the linchpins of learning. I long for that same level of engagement on a weekly basis. Inspired by the recent presidential debates and a mock election project organized by the 11th grade students at our school, I recently offered three options for my weekly formative assessment (hereafter called the "quiz"). After reviewing the quiz questions, students could choose to take it as "Independents," "Republicans," or "Democrats."

The Rules of Engagement

"Independents" took the quiz without notes or collaborative assistance. To reward the extra difficulty of this option, whatever grade they received would be bumped up by one letter grade. "Republicans" were allowed to discuss with other "Republicans" the questions and share strategies (but not write anything down or use calculators) for 15 minutes. After this, they took the quiz independently and without

notes. Whatever grade they received they could feel confident they had earned, no more and no less. "Democrats" were allowed to collaborate and use notes throughout the test. However, their grade would be the average of the "Democrats" as a whole. Everyone had to turn in their work and I would average their individual grades for the group grade. I should mention that the quiz was designed to be challenging even with notes. All questions were free response and most required synthesis and abstraction.

I should also note that in asking students to select a political party, I did not (and do not) claim to represent the complex ideologies of these voter groups. The intent was to simply observe the different approaches students would choose in preparing and taking a test. The labels themselves were convenient and current, given that many of my senior students were preparing to vote for the first time in the upcoming election. Both the students and I understood that the complexities of party ideology can hardly be represented in a simple assessment option. Furthermore, no attempt was made (or hopefully implied) to associate a student's choice with their actual political preferences. Any overlap was coincidental and irrelevant to the exercise. Nor did I observe any politically oriented banter among the students. They seemed to recognize the experiment for what it was.

Results

The traditionally lower performing students tended to opt for the democratic option. The highest performing students gravitated towards the "Independents." I wasn't surprised that the highest scores were among the "Independents" but interestingly, so were the lowest. The "Republicans" scored about the same as the "Independents" on average but when they misunderstood something, they seemed to misunderstand as a group. I suspect they were sidetracked by influential, but incorrect opinions that weren't corrected by a group vetting process. Thus, if a trusted source had a misunderstanding, the whole group missed the question.

On average, the "Democrats" took about twice as long to complete the quiz, but they performed better than either of the other groups, by a full letter grade. I observed that they questioned each other more. Their strategies and answers varied—a lot. By any objective standard, these were the lowest performing students in the class. Their questioning,

however, was their strength. Everyone had to be convinced before they adopted a solution.

The testing atmosphere dynamics were fascinating. The "Democrats" quickly found that a test-by-committee approach was inefficient. They broke into smaller groups that then crosschecked their results. The "Independents" were both the most vociferous and the most subdued. One moment they crowed their prowess and the next were pleading for hints. The "Republicans" were—dare I say it—all business. Polite discussion followed by nose-to-the-grindstone focus.

The distribution of the twenty students into parties was about even: five "Independents," eight "Republicans," and seven "Democrats." There was one particularly poignant moment when a student chose "Republicans" because she didn't want to bring down the grade of the "Democrats" by having to average her grade in. An unintended but pleasant consequence: once the "Democrats" had reached consensus, grading was trivial. In the end, I suggested the "Democrats" turn in just one test to represent everyone. Their choice of student shocked me. Two days ago, he would have not been able to contribute anything. He had given up on that week's lab and only under duress had agreed to spend an hour after school to shore up his understanding—from worst to first in 24 hours. Not only had his effort paid off, but the recognition of his peers was an ego shot in the arm he'll likely never forget.

Post-assessment Reflections

I have never seen students work so hard for so long on a test. The "Democrats" skipped break all together and used the whole 2 hours—productively! It may not have been a rigorously authentic assessment like a public exhibition, but it walked, swam, and quacked like the real thing. Afterward, the students were exhausted. Those that had arrived unprepared learned a lot about thermochemistry. And everyone learned something about what they can do to be successful.

After this inaugural party-line quiz, I wondered if they would choose differently a second time. The next time, the entire class chose to be "Democrats" except for two "Independents" and no "Republicans." When it comes to grades, political ideologies are subordinate to exploitable loopholes. Not to be outmaneuvered, I countered by

deducting a letter grade from the "Democrats" average score reasoning that the price for coming into the test unprepared was a limit on their grade—the best the "Democrats" could do was a 90%. Conversely, the "Independents" were rewarded for their preparation with a potential grade of 110%. With this change, the class split 50/50 into "Independents" and "Democrats." It's as though the students needed a clear incentive to get engaged—either benefiting from others or from an inflated grade. They had no interest in an option without an upside (in this case, "Republicans").

So, what are my take-home lessons? The trickiest part is preparing an assessment that is challenging to a student using notes and yet not so difficult that an "Independent" without notes is overwhelmed. It also helps if the "Democrats" can be isolated. Their rambunctious banter is distracting to the "Republicans" and "Independents." At this writing, I continue to reach across the aisle to find that consensus middle ground that maximizes engagement. I'm thinking an electoral college. I can hardly wait for mid-term elections.

To learn more about Dr. Don's wild ideas, visit his digital portfolio: https://sites.google.com/a/hightechhigh.org/sustainable-energy-technologies/home

Upside Down Exhibition

Kiera Chase
Envision Schools, Oakland CA

Envision Schools were founded on best practices of school design, rigorous college-preparatory curricula, small and personalized learning environments, and a focus on measurable results. These goals are achieved within a project-based learning environment that emphasizes deeper learning and the integration of arts and technology. Envision believes that through focusing on rigor, relationships, and results, we can foster a vibrant learning community that can increase student engagement and empower students to succeed both in college and in life.

Envision participated in a Khan Academy pilot project after a successful collaboration during summer school in 2011. In this role we worked closely with the Khan Academy team to develop curriculum that integrated Khan Academy into our project-based environment. This was made possible through a generous donation of Chromebooks from Google that enabled us to provide access to Khan Academy, Upside Down Academy, and other web-based tools.

Upside Down Academy resulted from a partnership with Jared Cosulich

of Puzzle School and the Envison Schools. This Academy turns the school paradigm upside down, with students becoming teachers. By switching the roles, we wanted to foster a sense of urgency around learning and create opportunities for students to explore teaching and learning in a new way. Our goal was to incorporate this new tool into our ninth grade mathematics class at two of our schools.

Our project-based model provided an interdisciplinary learning environment that allowed students to construct new meanings and apply their academic learning. Leading educational theorist John Dewey (2009) described the nature of learning as experiential, that through exploring, thinking, reflecting, and engaging with one's environment, deep learning occurs. These projects strive to display student work and knowledge authentically. We call these projects "exhibitions of learning."

Algebra I is considered a gatekeeper to future academic success in both high school and college (Maccini, McNaughton & Ruhl, 1999; Harvey, Waits & DeMana, 1995). We felt challenged to create a relevant and rigorous exhibition that would support this core content. Building on this constructivist approach to learning, we strove to engage our students in their own learning process. That way, they could deepen their understanding of Algebraic concepts and their identities as members of a teaching and learning community (Anderson, 2000). Jonassen (1994) described the characteristics of a constructivist learning environments as: a) meaningful and authentic context, b) collaborative and social construction of knowledge, and c) thoughtful reflection on experience and meaning. These characteristics guided our project design. Through this process, students would have the opportunity to publicly share their knowledge, which we hoped would foster authentic dialogue about their thinking. We also expected that this sharing process would lead to deeper self-reflection by the students.

The Process

Once the prototype of the website was constructed, we piloted the process with a group of four students who volunteered to work with us after school. We introduced them to the concept of the site simply. We stated that this platform offered them an opportunity to demonstrate their understanding by teaching a short video-based lesson on a math concept of their choice. We decided to constrict the parameters to

mathematics because we wanted these demo lessons to act as possible work samples for the larger project.

The students spent an afternoon working on their demo lessons. They first identified a concept that they knew well. After that they storyboarded and filmed their videos. Although they collaborated on the process, each student ultimately created his or her own video. On the second afternoon, the students uploaded their lessons to Upside Down Academy and completed the supporting narrative. Finally, after their video tutorials were shared by their teacher in a regular math class, we spent an afternoon reflecting with the students on the entire process.

This pilot revealed that identifying a concept to teach was easy for the students. The process of storyboarding offered students the opportunity to think creatively about how to teach the concept. In all cases, however, the pilot lessons took a similar format. In three of the four videos, students stood in front of a white board and talked the viewer through the algorithm while solving the problem.

Two types of reflections emerged: practical and pedagogical. The practical concerns related to physical experiences in both the production and viewing stages. Some of the production observations students made involved lighting, blocking, being prepared with the correct numbers at each step of the solution, being audible, and using the correct vocabulary. Pedagogical concerns related to the teaching and learning process as well as teaching strategies. For example, the students realized that simply teaching the steps to solve an algorithm might not always translate into a deep understanding of the concept. Similarly, students noticed that not all learners could access understanding through this type of medium. This pedagogical discussion brought to light the realization that students learn in different ways and that the job of a teacher is to provide multiple pathways toward understanding. The students who participated in this pilot agreed that being a teacher is difficult.

After the pilot study, we realized that we needed to further scaffold the process. The students' reflection about learning came only at the end of the pilot process, and we wanted to incorporate these reflective practices throughout the exhibition. As a result, we implemented some major changes to the next iteration.

The Exhibition

We began the exhibition work with a week of reflection. This allowed students the mental space to be thoughtful about their own strengths and challenges as learners. In their Digital Literacy class, the students took several learning style inventories and reflected on the results. They completed short reflections about the teaching strategies that they observed in all of their classes, especially those that supported their own learning styles. Meanwhile, the math teacher used several video-tutorials to explore pedagogical differences between the approaches. For example, the students watched video tutorials on Khan Academy and compared these to the video tutorials created during the pilot. A number of students identified that they preferred the use of different colors to denote different stages in an equations solution, as is the case with Khan Academy. Others preferred seeing the person teaching the concepts, and some students preferred video simulations void of narrative.

The students then worked in both their Algebra I class and their Digital Literacy class to identify an Algebraic concept that they wanted to teach, storyboard their video-tutorial, film their lesson, and then upload the lesson and supporting narrative to Upside Down Academy. This process was much the same as the pilot, except that the process was broken down into benchmarks. What differed greatly from the pilot was that students were given enough time to complete the cycle twice, which allowed for peer and teacher feedback to be reflected in their second video. Some students chose to use a new web-based whiteboard tool called "educreations." The videos were posted online to serve as a resource for their classmates.

This process of being accountable to the larger school community and the general public provided an authentic and powerful point of reflection for the students. Many students realized that these video tutorials were not simply serving as an assignment for their classes but also had real utility to their potential viewers. As their work became a part of the larger body of teaching and learning resources, students paid more attention to the detail and the pedagogical strategies that were used in their videos. As is described by Kerchner (2012), something about the "transparency of what students and teachers are up to that gives new meaning to public participation" and this meaning came

when students received comments on their lessons. Kerchner referred to web-based tools that facilitate what is termed Learning 2.0. This new structure for education is thought to meet the needs of our current society more effectively than the industrial model of the past, which does not prepare students for today's workplace. The experience of transparency and public participation was central to the success of Upside Down Academy and this Exhibition.

Conclusion

The increased and fluent use of technology within educational practice is indisputably a positive venture. Upside Down Academy provided students with access not only to general technology-based tools but also to specific tools for online video tutorials. Like many other Web 2.0 tools, this platform fostered a community of learners and utilized social media-like qualities of public commenting. These capabilities led to students' comments about how being publicly accountable changed their engagement with the material and their constructed sense of audience. Both the concept of audience and that of a community of learners are important foundations to developing an awareness of online presence and digital safety. These are concepts that are at the heart of improving digital literacy.

Students reflected about how the process improved their understanding of the math concepts that they taught. They attributed their improvement to a number of factors, ranging from public accountability to having to record their lessons multiple times. Students felt that they learned from each others videos and about themselves as learners. They articulated their strengths and challenges within a teaching and learning relationship and were able to discuss ways to facilitate and improve on work.

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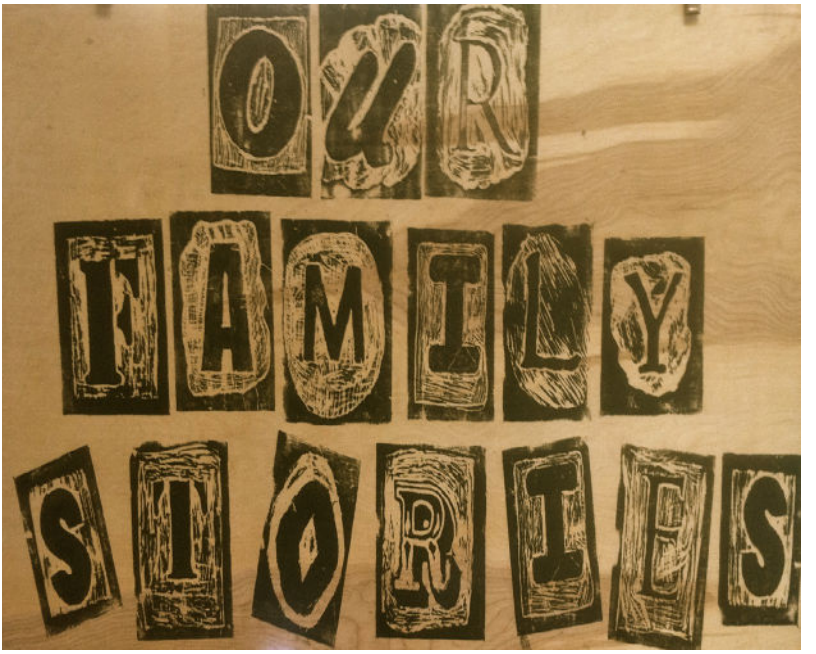
Project Gallery

Teachers and Students
High Tech High 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.


OUR
FAMILY
STORIES

Choose Your Own Adventure

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

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

Student Reflections

This project got me interested in learning about my family history and genealogy. I was already interested in history, but this project gave me a base to learn more and dig a little deeper. I like that we learned a lot about probability and about real life consequences that were related to our risk taking. *—Aiden Ramirez, 4th grade*

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

—Alberto Rosas, 4th grade

Ruby Bridges was black and wanted to go to a white school, so she did and if Ruby Bridges didn't do what she did we would probably be in separate schools now. *—Gracie Suarez, 4th grade*

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

The Dark Side of Style

by Aubrey Niegocki

Uniforms change the mindset of the normal eighteen-year-old boy. This uniform covers the boy's identity and makes him a part of a group

Multitasking

by Naja Thomas

If someone were doing a hard math problem while listening to music, she would be more likely to forget what she learned. She would also make more errors

Conformity

by Jack Halpain

When we are uncertain, we look to others for confirmation or acceptance. Typically, the more difficult the task, the greater the conformity

How to Spot a Lie

by Sophia Ferretti

When people lie, they show a number of signs. These signs can be anything from the way they talk, to the micro-expressions they subconsciously make with their faces

Why Do We Dream?

by Sierra Stratton

Allan Hobson and Robert McCarley came up with the activation-synthesis theory, which states that dreams are random and have no important meaning to them

The Paradox of Choice

by Mauro Chavez

The idea that more choice makes us happier is nothing more than a popular fallacy

Loss Aversion

by Nicolas Dante Dilliott

The emotional response from the brain concerning losses is much stronger than the response concerning gains

We Are the 37%

by Jessica Sloan

As a result of the false consensus effect, the protesters in the Occupy movement had a sense of exaggerated support for their beliefs and views

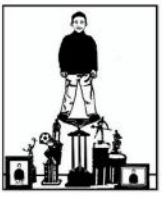
Affective Forecasting

by Eddie Akunada

Our goal in life is to be happy. When our expectations are too high, we often become disappointed

Praise: The Double-Edged Sword

by Matt Hansen



Praise is a seemingly harmless way of recognizing an accomplishment, but in actuality it can be destructive

Enclothed Cognition

by Aubrey Niegocki

Scientific tests show that when people wear different clothes, they think differently

Gambler's Fallacy

by Ryan Khong

Gambler's fallacy is the notion that past outcomes in a game of chance will affect future outcomes

Psycarnival

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

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

Teacher Reflection

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

Student Reflections

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

—Matthew Hansen

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

—Mauro Chavez

A Fly on the Wall

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

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

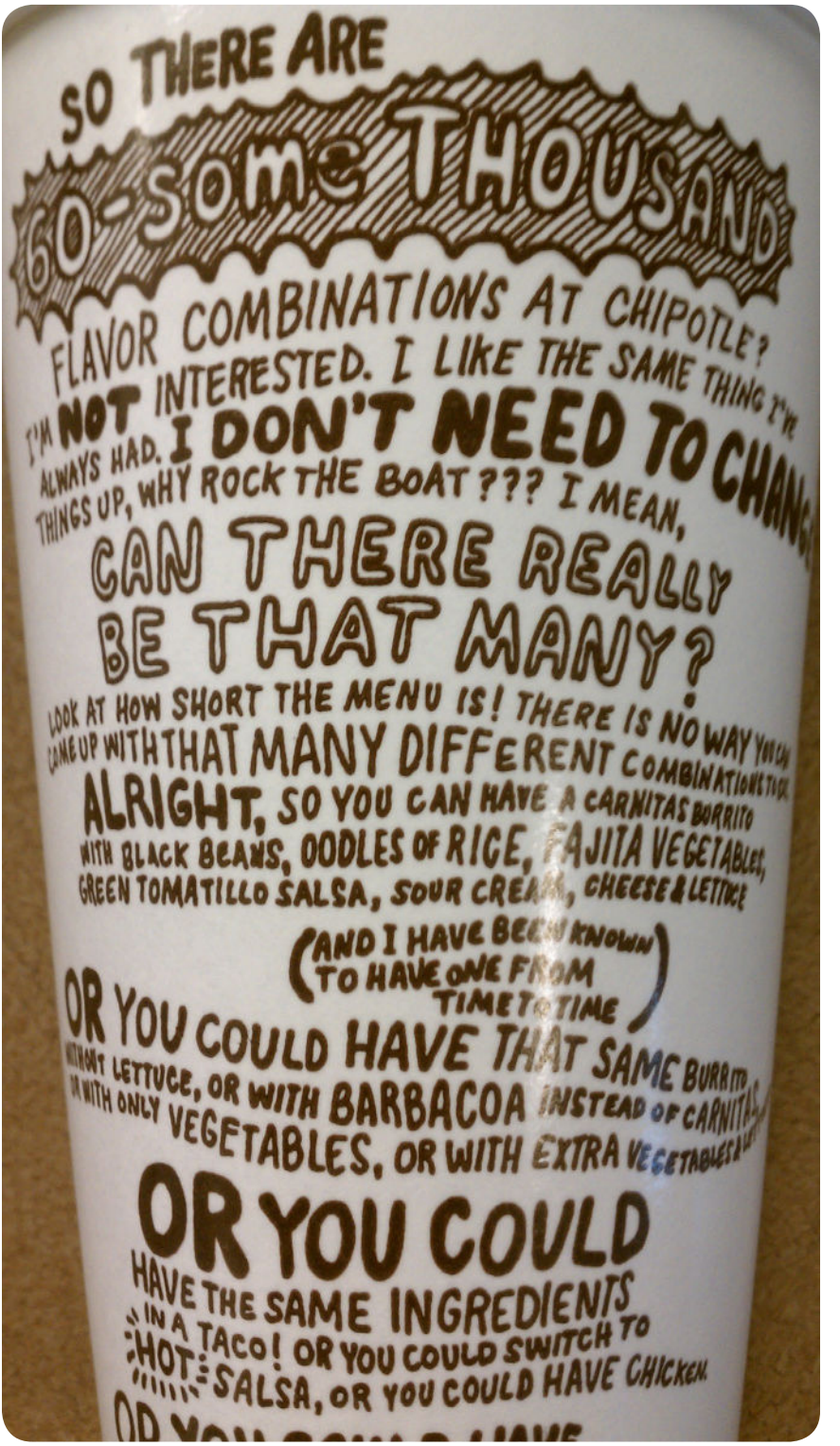
Teacher Reflection

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

Student Reflections

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

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


SO THERE ARE
60-SOME THOUSAND
FLAVOR COMBINATIONS AT CHIPOTLE?
I'M NOT INTERESTED. I LIKE THE SAME THING I'VE
ALWAYS HAD. I DON'T NEED TO CHANG
THINGS UP, WHY ROCK THE BOAT??? I MEAN,
CAN THERE REALLY
BE THAT MANY?
LOOK AT HOW SHORT THE MENU IS! THERE IS NO WAY YOU CAN
CAME UP WITH THAT MANY DIFFERENT COMBINATIONS TOO
ALRIGHT, SO YOU CAN HAVE A CARNITAS BURRITO
WITH BLACK BEANS, OODLES OF RICE, FAJITA VEGETABLES,
GREEN TOMATILLO SALSA, SOUR CREAM, CHEESE & LETTUCE
(AND I HAVE BEEN KNOWN
TO HAVE ONE FROM
TIME TO TIME)
OR YOU COULD HAVE THAT SAME BURRITO
WITHOUT LETTUCE, OR WITH BARBACOA INSTEAD OF CARNITAS
OR WITH ONLY VEGETABLES, OR WITH EXTRA VEGETABLES &
OR YOU COULD
HAVE THE SAME INGREDIENTS
IN A TACO! OR YOU COULD SWITCH TO
HOT SALSA, OR YOU COULD HAVE CHICKEN

Chipotle Challenge

Bryan Meyer, Mathematics, High Tech High North County

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

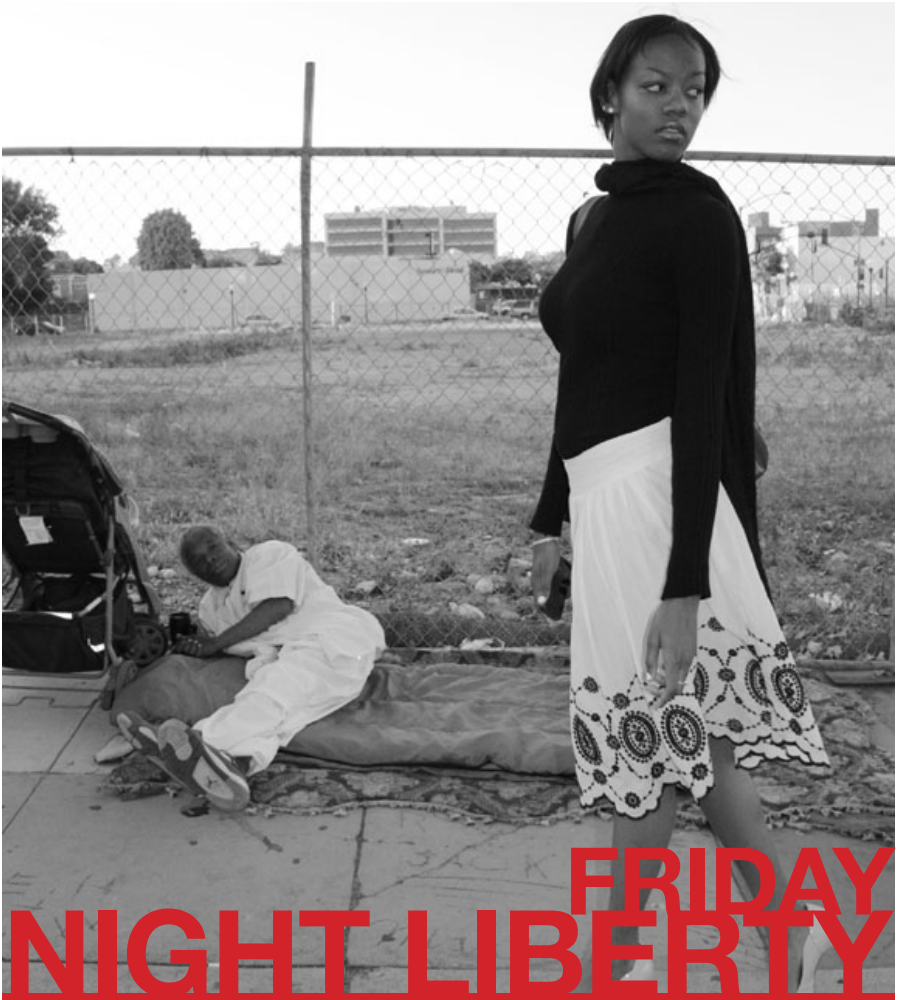
Teacher Reflection

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

Student Reflections

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

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



FRIDAY NIGHT LIBERTY

NOW: Contemplations on Contemporary Society is a thought-provoking exhibition of conceptual photographic art. Through the eyes of 49 young artists from High Tech High, you will have the opportunity to see what they consider to be significant about society today, whether it be a transition or transformation in their own lives or an event or phenomenon impacting a larger population. Prints are in both color and black and white and have been developed digitally or using a silver gelatin emulsion.

A special thank you to NTC Promenade Friday Night Liberty, AJA Project, Alan Ziter, Ashleigh Starke, John Thurston, Bryan Miller, Marv Sloben, Shawnee Barton, High Tech High staff and faculty, and friends and family.

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

In 1,000 Words

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

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

Teacher Reflection

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

Student Reflections

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

—Jordan Edmunds

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

—Sophia Thomas

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

The Boneyard Project

Nick Ehlers, Biology, High Tech High Chula Vista

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

Teacher Reflection

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

Student Reflections

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

—Marissa Boyer and Lorenz Alfiler

Revealing Riches: Mentoring in a Clinical Credentialing Program

Zoltan Sarda and Amy Reising
High Tech High Credentialing Program

Benjamin Disraeli once said, "*The greatest good you can do for another is not just to share your riches, but to reveal to him his own.*" This precept is at the heart of effective mentoring relationships and illustrates what is, in effect, a process of co-constructing knowledge between mentor and mentee that is necessary for the development of beginning teachers. There are complex aspects to teacher mentoring relationships, which distinguish them from other forms of teaching and learning. Part of this complexity has to do with the fact that teaching is a practiced art form. Experienced mentor teachers must define and articulate elements of their own practice that, in many ways, have become automatic, being composed of a repertoire of techniques and responses to student need and behaviors. Another area of complexity is that beginning teachers must translate what they learn from their mentors into their own voices, and develop their own repertoire of skills to be applied to a variety of situations. Finally, teacher mentoring takes place between people that are, more or less, peers, and the participants must deal with enduring perceptions about traditional teaching and learning that have to do with issues of hierarchy, influence, and knowledge development. This is particularly

true in clinically based credentialing programs in which the beginning teachers and mentors are colleagues.

These processes are always present, even within approaches to mentoring new teachers that advocate for a co-construction of knowledge. The presumption here is that effective growth requires open and egalitarian dialogue, collective celebration of progress and collaborative goal setting. We contend that the degree to which the complex issues described above are addressed influences mentoring programs' success. This article describes some of the theoretical and practical aspects of mentoring as they relate to these issues, and will describe illustrative examples from the mentoring program in a clinically based credentialing program at High Tech High Credentialing.

Conceptualizing Teacher Knowledge

Researchers Marilyn Cochran-Smith and Susan Lytle (1999) assert that there are three differing conceptions of teacher knowledge: "Knowledge for practice," "knowledge in practice," and "knowledge of practice." Each conception of teacher knowledge carries implications for models of new teacher learning and development. Cochran-Smith and Lytle argue that the most prevalent conception of the three across teacher education programs is "knowledge for practice," placing an emphasis on developing deep formal knowledge about learning theories, pedagogy and content. In this model, to become effective practitioners teachers must "implement, translate, or otherwise put into practice the knowledge they acquire from experts outside the classroom" (p. 255). This is the model of teacher knowledge development for the vast majority of student teachers in traditional education programs.

In terms of implications for full immersion, clinical practice models the inherent conception of teacher learning inherent in a fusion of "knowledge in practice," and "knowledge of practice." The conception of "knowledge in practice" holds the view that teaching is "an uncertain and spontaneous craft" and that knowledge is held and expressed in the various actions and decisions teachers make in the day-to-day process of teaching. In this view, teachers learn from having "opportunities to enhance, make explicit, and articulate the tacit knowledge" (Cochran-Smith and Lytle, p. 262) that comprises expert teachers' practices. This conception of knowledge goes hand in hand with the third conception, "knowledge of practice"—conceiving

knowledge as being constructed through teacher networks and communities of practice that function to construct knowledge as it is developed in particular individuals and in specific contexts of use.

Blending The Conceptions of Teacher Knowledge

How do these conceptions of teacher knowledge translate to the training and development of new teachers in clinical practice models? First, clinical practice models in which teachers act as full-time classroom instructors while earning their credentials provide organizations with the ability to hire teachers with experience in fields other than education or who are recent college graduates. They also provide opportunities for career changers interested in pursuing careers in education but who are unable to enroll in traditional, full-time university-based programs. This practice of hiring teachers who are new to teaching but who have deep disciplinary content knowledge from prior experience is key to the concept of knowledge for practice. There is an assumption that people coming from fields of business and industry have comprehensive knowledge of their specific disciplines. Knowledge of theory, pedagogy, classroom structures, assessment, and differentiation are introduced in methods classes, and reinforced through conversations and observations with mentors. The new teachers apply their developing skills in real time, and in classroom contexts in which they are more fully responsible for student learning. These structures function to provide theoretical knowledge for new teachers within the context of the environment in which they are working. In this approach, knowledge of theory, philosophy and practice are developed through teaching and learning relationships within the authentic communities of practice in which the new teachers are employed and are full participants.

The Role of Mentoring

In keeping with the idea that teacher knowledge is expressed through the various actions and decisions teachers make in the ongoing practice of teaching, and is developed in the context of local communities of practice, mentoring must play a critical role in the development of new teachers in clinical practice programs. The guiding belief central to this approach is that there are crucial benefits in having mentoring occur on site and in the context of a particular organization's approach. Mentees must have easy and frequent access

to their mentors. There is great benefit to the fact that mentors are implementing the same approaches their mentees are developing in real time, in the same building, and with the same communities of students. In these situations, modeling, feedback and discussion are facilitated by proximity and common context. While there are benefits in implementing collegial relationships such as those described here, there are practical concerns related to providing ongoing support to assure that they are effective. These concerns include:

- Providing support for mentors and mentees to adequately define and articulate effective teaching practice.
- Defining and developing mentor roles, mentoring strategies and mentor identities.

Examples From One Program: High Tech High Credentialing

Mentoring relationships are part of a robust adult learning community within the High Tech High organization. High Tech High is in a rare position in the charter school world, as teachers who are hired without credentials automatically become part of a two-year District Intern Credentialing program. A vital aspect of this program is that each Intern is paired with a Mentor with whom they meet weekly. A second component of the High Tech High Credentialing Program is an Induction Program for teachers who are working to clear their credentials. These Induction teachers are also paired with Mentors. In this model, new teachers are supported for the first three to four years of their careers. Of the 240 teachers that High Tech High employs, approximately 200 are involved in mentoring relationships either as a mentor or a mentee.

These mentoring relationships occur within a context of daily morning meetings at each school site that include all staff, grade level team, and/or discipline groups. Regular discussion, project tuning, and problem solving are key components of the daily environment within the organization as a whole. The mentoring relationships that exist are integral parts of the adult learning community, both contributing to and dependent upon the organizational climate of mutual support and open dialogue.

The Model

The basic premise of the mentoring model is that meaning and

knowledge are co-constructed between the participants and that this process requires specific relational characteristics between mentor and mentee. Awaya, et al. (2001) outline five ways of defining mentoring relationships that are reflective of this model:

- The mentoring relationship is a journey.
- The relationships are egalitarian.
- The mentor is "a guide to practical knowledge"(p. 49).
- The mentor provides moral support.
- The mentors provide space for mentees to develop their own practice by being minimally directive and guiding through questioning.

The mentors in HTH's program readily adopt these definitions of mentoring, primarily because they are also integral characteristics of the organization in general and are representative of approaches to curriculum implementation and relationships among faculty, staff and administration. Two of these characteristics, however, are the subjects of recurring questions and discussions with mentors: Mentor as guide to practical knowledge, and the practice of guiding through questioning while being minimally directive. These components are also core to the development of mentor identity.

We have found that mentors benefit from support in developing mentor identities and practice in much the same way that they are supporting their mentees in developing teacher identities. In identifying ways to support mentors we are guided by the questions:

- "What are the defining characteristics and structures of effective mentoring relationships?"
- "What questions do our Mentors have about these relationships and about the unique characteristics of mentoring colleagues?"

Mentor Identity

Mentors are primarily practitioners in their own classrooms, and the role requires them to step into the role of defining and making explicit the tacit aspects of expert practice. The mentor role also requires them to guide developing thought and practice in a collaborative way. Mentors' discussions have often focused on what kinds of questions will influence effective reflection and growth, and at what point is it

appropriate to make specific suggestions when they believe that their mentees are not making progress. One mentor recently stated, "My instinct sometimes is to just tell my mentee what to do, but I know that's wrong. It's hard when it is clear to me what he can do to improve, but I also am stuck in how to help him see for himself. I don't always know good questions to ask to help him move forward." To address this common question, we have embarked on a collaborative approach in our mentor trainings to both define and make explicit effective teacher practice and to develop effective questioning strategies.

Defining Practice and Guiding Questions

In mentor trainings, discussions have focused on the fact that teaching is often described in somewhat magical terms. A common refrain within the organization is to refer to expert teachers as "rock stars," which, while being a wonderful compliment, also implies a certain level of achievement unattainable by most. Part of the mystique lies in the fact that the myriad plans, decisions, thought processes, and actions that expert teachers employ function at a level of automaticity, often appearing to be spontaneous and seamless. It is a much more complex example of other activities that become automatic, such as driving, in which novices are focused on executing the components of the task in awkward and self-conscious ways until they are able to integrate the parts into an elegant and seamlessly executed whole.

Over the course of the last year, High Tech High Mentors have worked together in meetings to develop descriptions of explicit characteristics of practice in regard to how teachers think about and develop classroom structures and routines, what student engagement and motivation look like, and concepts related to differentiation and equity. The questions that have guided this inquiry process include:

- "What does this aspect of teaching look like and sound like in the classroom?"
- "What specifically are the students doing?"
- "What specifically is the teacher doing, or what did the teacher do to influence this aspect of teaching?"
- "What evidence is there of how the students and teacher are thinking about this aspect of teaching and learning?"

In addition to the descriptors of practice, Mentors have also been

working collaboratively to develop a series of questions that are intended to either raise awareness about a concept of teaching, or refine practice that is already part of the new teacher's developing knowledge. Our core theory of action in regard to this process is that teacher knowledge is primarily developed through a growing ability in "how to see" what is happening in a classroom, and "how to think" about practice. These resources have been made available online in a set of Mentor Reflection Guides and are intended to be used collaboratively in mentor/mentee discussions. Trainings for both mentors and beginning teachers have focused on using these Mentor Reflection Guides in conjunction with videos of lessons, observations in both mentor and mentee classrooms, as well as collaborative observations of other teachers within the organization. These resources are being continually refined through submission of Weekly Mentor Logs that the mentors complete online, the contents of which are disseminated back to the mentors and mentees through an ongoing blog.

Our intent in developing these structures has been to infuse the community with ongoing reflection and dialogue about teaching practice, mentoring strategies, and to provide feedback and moral support for these important relationships. We have found, in general, that the new teachers express great appreciation for the mentors with whom they work. Their conversations range from focusing on teaching strategies and support with curriculum content, to issues like establishing positive relationships with parents and working effectively with colleagues. We have also heard from many mentors that the opportunity to support new teachers has given them new insights into their own teaching practice. In a recent discussion with a group of visitors seeking information about establishing mentoring programs in their own school district, one mentor was asked to describe her experience. After detailing meeting schedules, topics of conversations and pragmatic issues like making time for observations, she enthusiastically stated, "The best thing about mentoring is that I am learning so much myself. It gives me the chance to think about teaching in a detailed and reflective way that I probably wouldn't do if I was just teaching in my own classroom." This statement is reflective of the sentiments of many mentors in the program, and is evidence that revealing knowledge and "riches" through the process of mentoring is a mutual endeavor.

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To learn more about the High Tech High credentialing program, visit: http://www.hightechhigh.org/about/educator_training.php

Everyone a Mentor

Susan Foley and Gretchen Morse
University Child Development School, Seattle, WA

As the students get ready to hear a story, one student, Eleanor, stands before the group. This story is the year's first published student story in this class of three, four and five year olds. When the year began, students were introduced to a language arts activity during which they were encouraged to write and draw, inspired by a subject of their choosing. Eleanor looked forward to writing time each day. She loved sharing her knowledge of letter sounds and techniques for drawing. With guidance from a teacher, she soon began writing sentences to go with her vibrant illustrations. As Eleanor became more skilled and confident in the writing process, she was encouraged to try writing a story. She took on the challenge enthusiastically, meeting with a teacher to consider the elements that make a story interesting to read. She created a story plan to guide her through weeks and weeks of crafting her story one page at a time. When Eleanor completed her writing, she helped type and bind her masterpiece.

Now with the final draft in hand, Eleanor reads her book to her class. Sitting in the audience is a boy who has not yet embraced writing and

who cautiously accepts writing challenges. Rob has great interests in non-fiction books and knows many facts about a variety of machines and creatures. But when he considers subjects to write about, he often chooses to write and draw something he perceives as "easy." For example, his notebook is filled with swirls and circles that he has labeled, "dirt, tornado, roller coaster," etc. Although Rob has a strong grasp of letters and sounds, it is only with ongoing encouragement that he attempts to write more than a single word.

As he listens to his classmate read her story, his eyes grow wide. He turns to his teacher and whispers, "Could I do that? Could I write a book?!"

A Culture of Mentorship

Moments like these are the essence of learning at University Child Development School (UCDS). UCDS is a community of learners designed so that every member is given the responsibility of both teaching and learning. This happens teacher to student, student to teacher, student to student and teacher to teacher. No one works in isolation. Everyone is called upon at one time or another to mentor and to listen, ask questions, share knowledge, explain thinking and build upon the ideas of others. Everyone has something to teach and something to learn. Just as we find in the real world, every individual has skills and knowledge to share as well as areas of challenge that need to be developed. One student might explain to a friend how to draw a butterfly, another student might be the expert on what letters make the /ch/ sound, and another may be writing a sentence about his or her picture using best guess spelling. A teacher might work with a student focusing on identifying the beginning letter sound in a word or facilitate another student's exploration of punctuation and capitalization.

Teachers are also learning as students explain in great detail which super villain fights Spiderman and what colors a poisonous snake would be and disclose what they understand and what they plan to do next. Anyone observing begins to realize that teaching and learning roles are shared and that who is teaching and who is learning changes according to circumstance. It appears that each member of the school community is both a learner and a teacher.

Teaching at UCDS has often been described as coaching or mentoring and attributes of both are infused throughout the UCDS experience, inside and outside of the classroom. With the overarching goal of supporting and guiding the personal growth and development of all its members, the community strives to increase capacities for self-direction and decision-making.

Mentoring Students

Teachers at UCDS take advantage of the diverse community within the classroom by inviting students to take an active role in mentoring each other. This does not mean that older students mentor younger students. Rather, every student is expected to take on both roles of mentor and protégé at various points in the day. Teachers spend a significant amount of time thoughtfully creating small groups for children to facilitate this practice. In the course of a single year, students are members of a wide variety of large and small groups of different children. Students are given opportunities to take on a variety of roles in the groups in which they work. Through regular reflection, students progressively understand how individuals support the group. Students are guided to set personal goals regarding their abilities to support and lead groups.

Literature Groups, for example, provide countless opportunities to underscore the many skills involved in reading. A student who is still working on unlocking the secrets to decoding text may have astute insights to share with the group about a story that has been read to him. As students reflect on the many skills needed to be successful at Literature Circles, such as listening, summarizing, predicting, making connections, utilizing prior knowledge, it quickly becomes apparent that we all have room to improve, and sitting among us are peers who can help us by sharing their knowledge and perspectives.

Mentoring Teachers

Just as teachers mentor the children's growth, they work to help each other grow in an energizing and stimulating work environment. Each year the teachers brainstorm and eventually choose a broad theme to explore. They innovate and create curriculum that integrates the theme across subjects. Teachers work together before the year begins to consider starting places based on the year's theme. As the class

begins this journey initiated by the teacher, limitless opportunities are encountered where the teacher can model discovery and inspire others to question. Teachers are mentored by their colleagues to venture outside their areas of expertise and, thus empowered, are able to direct learning in ways that make it relevant to the interests and experiences of the students. Because students are expected to actively pursue their interests as participants in the journey, their questions and wonderings often lead the group to deeper understanding. Students are routinely asked to reflect on their understanding and set goals for future learning. Through these reflections, teachers are able to assess individual progress and support the learning for each student.

Teaching at UCDS is dynamic. With the theme changing every year and curriculum expected to be responsive to the unfolding understanding and interests of the class, teachers routinely create new lessons. If the task of creating new lessons was taken on by an individual, it would indeed be daunting. At UCDS however, teachers work in teams, making the task exciting, interesting and invigorating. Children's classes with specialists are scheduled to allow teachers from the same grade level two hours each week to plan curriculum. As we see with children, each teacher has unique interests and skills to share with the group. Teachers collaborate with colleagues in a variety of groupings, from grade level teams to cross-school committees, and receive feedback and inspiration from their peers. Collaboration is an essential feature of the mentoring relationship; the time given to teachers to meet with various teams of peers clearly indicates that collaboration is highly valued at UCDS.

For a teacher who is new to UCDS, teaching as part of a team can take getting used to. A system is in place to support and assist a new teacher's personal growth with a focus on long-term personal career development. During a teacher's first year, he or she is paired with an experienced member of the faculty. This mentor guides the new-to-UCDS teacher to define areas of personal strength and to clarify areas where the teacher desires or needs to grow professionally. Mentors listen, model community behaviors, attitudes and values, and make suggestions without stipulating outcomes. This is done informally through many daily, informal conversations. In addition, a formal meeting is set aside for these mentoring pairs for one hour each month. At these meetings teachers tend to identify or define very broad goals that the mentor helps pare down to a more specific goal

that lends itself to a workable plan of action. Key to the teacher mentor program at UCDS is the understanding that individuals are responsible for directing the course of their own lifelong learning adventures. Teachers are encouraged and supported to actively advocate for their own professional development and personal career goals and to initiate courses of action. Teachers use the Teacher Profile, developed by the teachers at UCDS, to guide the peer mentoring process.

During the next two years, the new-to-UCDS teacher continues this process with the same mentor; however, the pair now shares roles, each giving as well as receiving support and feedback from the other. Because individual teachers are empowered to set professional goals, the process continues to be relevant and powerful. Over the years, for example, teachers have set goals ranging from documenting children's work to learning new technology to completing advanced degrees. Division Heads closely guide the teacher mentoring process, and each teacher at UCDS also meets with the Head of School to discuss goals and evaluation throughout the school year. The school supports the mentoring process through workshops, in-service training and continuing education opportunities.

Mentoring a New Author

Back in the classroom, the young boy is listening to Eleanor read her story. As Rob poses his question, "Could I do that? Could I write a book?" the teacher grins and asks, "What will you write about?" "Snakes," he says, "or maybe spiders. I'm not sure yet if it will be a true story or if I'll make something up!" She imagines guiding him to include detail to his drawings that depict the habitats of the creature he decides to write about. The teacher envisions the drawings he will be able to create of these creatures he knows so much about. Spiders and snakes are accessible to Rob's emerging fine motor skills. She realizes that his process will look quite different from Eleanor's. His enthusiasm will fuel a story plan that he will need to dictate to the teacher. Each day he will dictate his sentence, with the teacher writing all but the last two words. Writing two words each day will be a new challenge for him and the teacher is excited to capitalize on his determination, coaching him to work toward writing more words and eventually his own sentences. She turns to him with complete confidence and answers his query, "Of course you can!" Rob's teacher will guide his progress through the writing process; he can also call on Eleanor, now an experienced, published author, for information and feedback as he works through the writing process. Tomorrow a new author will begin his book.


AGENDA
open

Working Toward Integrated Schools: Relationships Matter

Tina Schuster Chavez
High Tech High North County

Hey, white girl. Move out the way!"

Without looking up, I knew two things: I was being spoken to, and I should move out of the way. At Thompson Middle School in Richmond, VA, there were less than 10 white girls in our entire school, and I knew that when it was time to change classes and walk through the halls, the faster I moved and the more I looked at the ground, the less likely I was to run into any trouble. The halls were tough, but riding the bus was the worst for me. Once my older brother moved on to high school, I was the only white student on the bus, and I was the last to get picked up. By the time I climbed onto the bus, everyone was sitting two or three to a seat already. I would have to be someone's third on a seat. I would walk down the aisle while the bus pulled away, not making eye contact, asking if I could sit down. Eventually, after being refused by everyone, the bus driver would yell into his mirror that somehow could see all of us, that someone better let 'that white girl sit down' or he was going to pull over the bus. Someone would always begrudgingly give me a few inches, and I would balance my way to school for the rest of the trip.

This was Richmond, VA in the late 1980s, but if you look at the data from that middle school today, the racial makeup is the same. Today's racial profile of my middle school, Fred D. Thompson Middle School, is 97% black, 2% white and 1% Hispanic. In a city where 44% of the population is white, 50% is black and approximately 5% is Hispanic, there is something not lining up in the schools. Since leaving Richmond, I have taken this imbalance with me, and I am especially sensitized to race in schools.

In the U.S. school system, the federal and state governments have tried different methods of integrating our schools. They have tried involuntary integration such as forced busing, and they have tried voluntary methods such as having parents apply to schools of choice like charter schools. Yet, today many public schools continue to be segregated institutions. In 2010, US schools were more segregated than they were in the late 1960s. Lockette (2010) offers the following data on new segregation: one-third of black students attend school in places where the black population is more than 90 percent. A little less than half of white students attend schools that are more than 90 percent white. One-third of all black and Latino students attend high-poverty schools (where more than 75 percent of students receive free or reduced lunch); only 4 percent of white children do.

One Creative Solution

When I moved to California three years ago, I was struck immediately by the number of smaller charter school options for students. In San Diego, I started working at one of these options—High Tech Middle Media Arts. One of the things that initially drew me to this school was the way that students were selected. I kept saying to my friends back East that this was how it was supposed to be. Students from all economic and cultural backgrounds were working together in groups on projects. These students would never have been in a schooling situation in which their varied backgrounds would put them in a classroom together, and here they were discussing books together and crafting projects together. In Virginia, I had seen the imbalance as a student, and I had been frustrated by it as a teacher. At High Tech High (HTH) schools, the academically and economically blind lottery system brings in a diverse mix and represents the city in which it exists. This plan attempts to expose students to different types of students and provides a place for them to work together in groups.

This integration of students in a school seemed initially to be too good to be true. I kept waiting for people to throw in the 'but' as they discussed the design principles or showed some of the student work, but the 'but' never came.

After a year on the San Diego campus, I moved about 40 minutes north to the North County campus. One thing that immediately struck me was that the student body did not seem as diverse. The school is designed to reflect the community that it serves. Yet the High Tech High North County (HTHNC) numbers reflected an under-enrollment in students qualifying for free or reduced lunch and in Latino and Asian students in relation to their numbers in community. Since the founding of HTHNC in 2007, there had been a lot of focus on how to diversify the current student body to make our zip code lottery reflect our community. I also wanted to delve into this issue and find out why our school was struggling with becoming more representative of the community. With the help of my 12th grade students, we went into one of the communities, Escondido, to attempt to increase enrollment in our school from the underrepresented socioeconomic areas.

Initial Assumptions

As part of this attempt I had to make a few assumptions about why certain groups of students might be hesitant to apply to HTHNC. After speaking with our former Director, as well as other staff who have looked at ways to increase our diversity, I narrowed down on some of these and began working off of these assumptions.

Assumption 1: They don't know about HTHNC.
When initial recruiting efforts began in 2007, the new staff went out in the community to recruit students. They handed out flyers at swap meets, stood in front of Wal-Mart, put advertising on NPR, and tried other similar methods of canvassing and getting out into the community to make students aware of HTHNC. In 2010-11 as well, there was a group of Latino HTHNC students led by two teachers at the school that went out in the community to specifically target Latino communities to make them aware of the charter school in San Marcos. The former director reported that she didn't think her initial efforts in front of random stores or other venues in the communities made much of a difference. She said that although there isn't data to report how families heard about the school, she "never had a family

come up to her at an information night and report that they had heard about the school from a flyer." Additionally, I spoke with an assistant to the Chief Operating Officer upon opening the schools. She tried similar recruiting efforts when the High Tech High Schools opened in the Point Loma campus. She explained that they also stood out front of stores in low income neighborhoods and passed out flyers at Swap Meets. Although her evidence is also anecdotal, she claimed that "these methods were not as effective as making partnerships in elementary and middle schools with the student body that High Tech High needed."

Assumption 2: Parents don't understand what a charter school is.
In addition to being unaware of HTHNC, I also speculated that parents might not understand charter schools because these schools can look very different from what school looked like when these parents were students. According to a 2010 national survey, 60% of Americans are confused as to what a charter school is. They often mistake it for a tuition-charging private school or think that there are strict academic requirements to get into the schools (Cavanaugh, 2010).

The 12th grade math class at HTHNC conducted community surveys in 2011-12 about common misconceptions of charter schools. The students went out in groups of three with different hypotheses centered on these misconceptions. In each study, the students were instructed to have a random sample size of 50 or higher. All students used age and gender as further factors and tried to balance age groups as well as gender. The only exception was students who were looking to see if particular age groups knew more about charter schools and who therefore targeted smaller age ranges. The students used an online survey as well as in-person surveys in Carlsbad, San Marcos, Escondido and Oceanside, which are areas that HTHNC serves. As a result of these surveys, the students noticed certain trends regarding misconceptions about charter schools:

- 19% of the adult North County population surveyed thought that charter schools charge tuition
- 66% believed that charter schools are more similar to a private school than a traditional public school (other options were given such as home schooling or write-in options)
- 43% believed that there was an academic requirement to get into charter schools

Judging from these surveys, it seems important that misconceptions

are addressed among the families interested in attending HTHNC.

Assumption 3: Transportation
When I met with a counselor at one of the middle schools we worked with, she suggested that the students may see the distance of a school in a different city as making it an unrealistic school to attend. Public transportation does not frequently run directly to the school. A student who lives 8 miles away may have to ride both a bus and train and walk to the campus, a journey that currently takes some of our students over an hour in each direction. Although HTHNC provides free public transportation passes to students who qualify for free or reduced lunch, the distance to travel and the time it takes may seem daunting.

Assumption 4: People don't have a reason to trust HTHNC.
If people in the community don't know about HTHNC or understand the charter school system entirely, they have no reason to trust people they don't know with their children. At a district school that a student is programmed to attend, families know that other people in their community have gone to that school. Whether it is perceived as the best option or not, it is a known entity to parents. I feel that this is the biggest factor limiting the diversity at HTHNC.

When the original High Tech High was founded, there were similar issues with the demographics of enrollment. The assistant to the Chief Operating Officer noticed the discrepancies in the free/reduced populations. They were under-enrolled as compared to San Diego Schools as a whole. She said that although they tried targeting different neighborhoods with flyers, it wasn't until they started working with organizations already in the communities that people started to trust people from HTH. So she decided to partner with San Diego elementary and middle Schools in the areas with the student body that HTH was lacking. After making a connection with a counselor on the staff at these schools, parents began to trust the HTH staff as well since they were working with someone familiar, and the community started to warm to the idea of High Tech High for their children. The assistant claimed that as word of mouth traveled, the diversity of applications increased relatively quickly. My conversations with this assistant and others led me to design a project with my 12th grade students where we would go into area middle schools so as to gain the understanding and trust from students and their families.

Testing the Assumptions

In an effort to build authentic relationships with students in underrepresented areas, I created a Government class project focused around the education system. The HTHNC students were able to make connections and forge relationships with two middle schools that have not had students apply to the High Tech High Schools. We established one-on-one relationships between the students and hosted some of these students for a Shadow Day on our campus.

This process highlighted the issue of trust mainly. However, I also learned from the middle school students that feeling safe in a school was at the forefront of students' minds. I hadn't thought about that in my initial assumptions. For the students coming from middle schools, they aren't as concerned about the types of courses offered or perhaps even the structure of the teaching. They want a place where they feel safe and where they know they can develop a positive relationship with their teachers. There were gang presences at the middle schools we worked with as well as bullying and fighting taking place on the campus. Seeing a campus during the Shadow day in which they felt safe opened up the possibility for students to apply and take a risk. Since it is rare that middle school students seek out a different high school than the one prescribed by their school districts, having students take ownership of where they wanted to go to high school was also a big deal. Some of the students who shadowed at HTHNC felt comfortable enough to apply to HTHNC themselves and tell their parents after applying.

Ultimately, I don't think that what parents want and what students want are different things. I still think that parents look for people or a place that is known to them or that they can trust. Parents entrust a school to work with their children for 6-8 hours, five days a week. It is not a simple decision for parents or students to apply to a new school that they haven't learned to trust yet. Trust is not established from simply handing out a flyer to a student or a parent at a store in which they are shopping. This technique could certainly pique someone's interest, but it takes an entirely different level of understanding of a school to entrust a child to it.

Thinking Ahead

Throughout this process, I got a glimpse into the difficulties of trying to simply enroll a diverse student body. Current neighborhoods and school districting policies set up a major barrier to truly integrated schools. Gary Orfield (2009), Director of the Civil Rights Project at UCLA, even claims that the money spent on busing and different forced types of integration could have been more used more effectively if spent on in mixing up housing patterns. However, since we are operating with the housing patterns that exist today, I used the enrollment flexibility of charter schools to try and address the other barriers to integrated schools that go much deeper than geographic restrictions. Through our partnership with one local middle school we had 11 applications from students for our 2012-13 school year. The previous year, we had zero applications from this same school. Of these 11 students, nine were admitted, and five chose to enroll as freshmen.

Five students out of a class of 150 freshmen may seem like an insignificant number at first, but it isn't. Change that happens on the small scale in schools can often be the most sustainable. These five students represent a year of partnerships in a new community. They represent a year working with a school and new families to earn trust. And most importantly, they represent a small step towards becoming a truly representative body of students of North County San Diego. It is the person-to-person outreach that has produced results. Now it is the job of High Tech High North County to work with all 9th grade students to make sure we are providing support to sustain a truly integrated school. After my 19 years of schooling and 12 years of teaching, on the other side of the US, I am finally getting closer to working a school that is reflective of the community in which it exists.

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To learn more about Tina's Action Research Project, visit: http://tchavezgsedp.weebly.com/

Clear Guidelines, Open Response: Introducing Peer Critique

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The author describes her approach to peer critique in her fifth-grade classroom at D.C. Prep Edgewood Middle Campus in Washington, D.C., a high-performing charter school serving inner-city youth. Inspired by the work of Ron Berger, the approach combines step-by-step instructions and modeling with open-ended reader response, encouraging original insights and "kind, specific and helpful" suggestions.

After spending days or weeks on a piece of writing—be it fiction or nonfiction, research or narrative—my students often struggle with the penultimate step of the writing process. Revision is commonly met with groans of, "I don't know what to change," and subpar attempts at improving the words on the page.

One antidote that many teachers employ is having students give one another feedback on their writing. While this may invigorate a student's short-term interest in their class work, many ponder the best methods to foster partner feedback that will truly make an impact

on student writing. I have struggled with this myself, attempting to teach my students various techniques to read and critique another student's work. All of my attempts came up short—students were not quite engaged in the process, their feedback was of low quality, and, perhaps most disconcerting, the feedback did not actually impact their writing. The writing did not improve as a result.

Then a colleague introduced me to Ron Berger's approach to critique and feedback. It not only revolutionized the way in which my students revise their writing, but the depth and quality of their feedback. Berger's approach is simple: "In order to create beautiful work, we must be willing to refine. To refine, we require critique and feedback. In order to critique, we need models and standards. For feedback to be useful to us, it must be: kind, helpful, and specific" (2012).

"Revising" Our Revision Process

With Berger's philosophy as my driving force, I set out to develop a clear way to teach my students how to conduct peer critique, with the goal of establishing a process that would be repeated in every new cycle of the writing process. I have taken the approach of explicitly modeling what I want to see them do. I divide peer critique over three days of writing class, hoping to establish a solid foundation for the year to come.

Day 1 provides a clear rationale and definition for peer critique. I tell my students, *"Our writing will only become better if we look at it again, through a different lens, and we make improvements. Good writers never write just once, they write, revise, re-write, revise, re-write, and so on and so forth until they have their best possible work. But sometimes, when we look at our writing again to figure out what we need to change, we can't decide what's wrong. That's what makes today's lesson so exciting. I am going to teach you a new way to revise, called "peer critique." Our classmates, or peers, will help us by reading and critiquing our writing. Because our writing is new to their eye, they give us a perspective that we do not have on our own. After they read our writing, they will offer us kind, helpful, and specific feedback. Kind feedback gives a compliment. Helpful feedback gives a suggestion, and specific feedback tells where to apply the suggestion."*

The most powerful aspect of this introduction is in the way that this process is now modeled. First, students read an example of student writing. Then, they watch videos of that student receiving strong peer critique on their writing. Students identify how and why this critique is kind, helpful, and specific. Afterwards, students are shown the revised piece of student writing, with improvements made based on peer critique (see below). It is clear to students that the end goal is to re-write, adding improvements to their writing. Therefore, the process must be honest and open.

*Brittany's Story **BEFORE** Peer Critique Feedback:*

Swim Josh Swim

"Can all you people stop splashing," I yelled with a nasty grin.

On a hot summer day, the heat burned on my face. I was in Bluegreen Resort.

"Brittany, can you teach me to swim?" my brother said.

But as he was paddling, he started to go under and started to drown. But he got better and better every time he tried. That's when he learned to swim, and he looked so proud and excited.

"Thank you Brittany," he said as he paddled and kicked all around the big pool.

As he was swimming he looked so funny but good at the same time. I thought to myself, "I did a really good job."

And I was so impressed, because he swim better then me now!

Edward's Feedback to Brittany:

I think you should describe more what you taught Josh. Also I think you should tell how old he is because people will be impressed that you were able to teach him.

*Brittany's Story **AFTER** Peer Critique Feedback*

Swim Josh Swim

"Can all you people stop splashing," I yelled with a nasty grin.

On a hot summer day, the heat burned on my face. I was in Bluegreen Resort.

"Brittany, can you teach me to swim?" my **five year old brother said with his million dollar smile.**

So as I was teaching him to swim, he just kept that smile. So I can teach him well.

So first, I told him to, "kick his feet," and he kicked them hard, splashing people all around us with water. Then I told him to "paddle his hands," holding them over his head and moving back and forth. It reminded me of when I first learned to swim.

But as he was paddling, he started to go under and started to drown. **So I had to help him a little. I stayed in front of him and had him swim towards me.** But he got better and better every time he tried. That's when he learned to swim, and he looked so proud and excited.

"Thank you Brittany," he said as he paddled and kicked all around the big pool.

As he was swimming he looked so funny but good at the same time. I thought to myself, "I did a really good job."

And I was so impressed, because he swim better then me now!

To solidify their understanding of kind, helpful, and specific feedback, students spend Day 2 providing individual critique as a class to a fellow classmate's writing—before working with a partner. New video examples of student peer critique are observed; this time, to point out what content based skills should be critiqued. What is the reader looking for when reading? Is the focus on writing clarity or sentence structure? Are they focusing on the elements of a specific genre, such

as narrative or informational writing? Providing this framework gives the reader a lens for what to focus on, allowing for helpful and specific feedback.

Day 3 is a culmination of sorts—students have been learning about peer critique over the previous two days, and they are itching to try it themselves. At the start of class, purposeful partnerships are revealed, and special meeting spots assigned. Students are given a protocol with time structures to emphasize process, rather than outcomes. At the start of the first official peer critique, the room is buzzing. Students are reading their work aloud, their partners jotting furiously as they listen. Partners respond with a compliment, then a specific, helpful remark, showing their peer exactly where in their writing to make a revision, and exactly what to improve. (see below)

WRITING PARTNERWORK

PEER CRITIQUE

Your Name: _____ **Partner's Name:** _____

DIRECTIONS: Listen to your partner read his/her story. Then give your feedback that is **KIND**, **SPECIFIC**, and **HELPFUL**!

WRITE ONE *kind* compliment and ONE *helpful & specific* SUGGESTION

To be kind, give a compliment using one of these prompts:

My favorite part of your story is _____ because

_____.

OR

I really like your story because _____

_____.

To be helpful, give your writer a suggestion and to be specific, tell the writer the part of the story where they can use your suggestion. Use one of the prompts below:

I think your story will be even better if you _____

_____. A good place to do this is the part of your story when

_____.

OR

I felt confused in the part when _____ because

_____. I think it would be less confusing if you

_____.

Peer Critique is Meaningless Without Rewriting

Following a successful peer critique partnership meeting, students need time and space to do two things. First, they need to reflect on the feedback they received, thinking about what to improve, jotting notes to themselves in the margins of their drafts. Second, they need time to actually re-write the section or sections of their work. The latter is even more compelling if students have an opportunity to revisit with their peer critique partner, sharing the improvements that they've made.

One of the major inhibitors to this process is time. It takes time to give children guidance for this process, and time to execute it, highlighting the individual and unique feedback that is provided to each student.

It takes time to revisit this process for new writing genres, time to revise, revisit, and revise again. However, peer critique is one of the most powerful processes that students can do to grow as writers. It teaches them a skill that is imperative for college: to be open to, and looking for, positive critique to make them smarter, more successful, individuals. This critique doesn't have to come from teacher or an adult—it can come from a peer. In fact, a peer's opinion may have a greater impact on a student's willingness to improve. The blend of guidance and openness implicit in this process opens the doors for better writing and stronger peer relationships.

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Unraveling the Knot: Critical Thinking in Presentations of Learning

Peter Jana and Daisy Sharrock
The Gary and Jerri-Ann Jacobs High Tech High

The questions asked by the teachers were probing to the point where [my son] had to go on an internal journey of self discovery so that he could see where his own thoughts were coming from.

—Gitu Daryanani, parent

A recent study sponsored by the Social Science Research Council found that 45% of college students make no progress in critical thinking, complex reasoning, or writing during their first two years of college. Perhaps even more unsettling, another study claims that approximately half of the students who start BA programs never finish and only 30% of those who enter community college leave with a degree (Grafton, 2011).

These studies are should not be viewed as the definitive word on the effectiveness of post-secondary education. However, they raise important questions for the K-12 level: What does college prep mean, especially in non-traditional schools with progressive forms of assessment? Should these recent studies influence how we define academic rigor in secondary schools?

While there is a wide range of opinions on how to prepare students for college and how to define rigor, there is a general consensus that critical thinking is an essential skill for high school and college graduates. State boards of education, educators spanning the collegiate and K-12 spectrum, and business leaders all claim that thinking critically is necessary for the intellectual development of individuals and the economic competitiveness of countries (Arum, 2011).

Presentations of Learning as a Venue for Critical Thinking

Presentations of Learning (POLs) and other types of performance assessment lend themselves to the teaching of critical thinking, but they are often overlooked for this purpose. Depending on the priorities of teaching teams or faculties, POLs typically fall within a spectrum between two poles, neither of which allows for demonstrating the analytical skills involved in critical thinking.

On one extreme is a content-based presentation where students are asked questions about facts. On the other extreme is a reflective presentation where students are asked to evaluate their academic development. The former has been criticized for promoting drill-and-kill at the expense of reflection or skills; the latter has been criticized for lacking rigor.

The authors' critical-thinking POLs lean toward the content side of this scale, but by making them a public performance where students are asked to analyze problems, we strive to avoid the pitfalls of the purely content-based POL. Additionally, our discussion-centered approach allows teachers to ask reflective questions when appropriate. Our critical-thinking POLs comprise a small group of student-panelists, teachers, and parents. They include presentations, Q & A, Socratic questioning, open discussion, and a debrief.

POL Guiding Principles

Critical-thinking POLs are based on the following principles:

1. Discussion should be prominent. A short student presentation encourages student-adult interaction as soon as possible. The presentation sets the stage, nothing more.

2. Use habits of mind. Critical thinking comprises a set of skills, and it is helpful for both students and teachers to share a common vocabulary about what those skills entail.

3. POLs are a preparation for exhibition night, whereby students and teachers can identify gaps in knowledge or skills to be addressed before a public exhibition of learning.

4. Parents participate. Not all parents will want to participate or know how at first, but by inviting them to join the discussion, teachers can build community and share the responsibilities of facilitation.

POL Structure and Preparation

1. Panels: Students are organized into panels of 4-5 students. Each panel meets for approximately 85 minutes—15 minutes for each student followed by an open discussion of 15–20 minutes.

2. Panel Prep: Student panelists exchange writing samples that have been assigned by the teachers. For example, in our latest project we asked students to share copies of paragraphs they wrote for the project web site. Students took notes on each other's work and came to the POL prepared to ask clarifying and interpretive questions.

3. Room Set Up: POLs are conducted around a table with extra chairs for guests. The intimacy of sitting at a table creates an atmosphere that is more conversational and less presentational. In addition to participating in their own POL panel, students are required to observe at least two other panels

Four Steps for Critical Thinking POLs

Critical-thinking POLs follow a four-step process:

1. Presentation

Panelists take turns giving short 3–4 minute presentations. Teachers should be specific about the content parameters and encourage students to keep their presentations as short as possible. Students typically make

claims or venture a hypothesis related to the class project. Unlike other POLs, our critical-thinking POLs do not involve students displaying portfolios or products related to the project. We save that for the public exhibition of learning.

2. Q & A / Socratic Questioning

After the presentation, teachers spend approximately 15 minutes asking questions. This period of time is divided into two different sections, which often overlap: Q & A, and teacher Socratic questioning.

The Q&A consists of clarifying questions and fact-based questions. Questions often follow up assertions made during the students' presentation. At this point the questioning is straightforward, such as "How does the average Haitian acquire clean water?" or "What positive control did you use for your experiment?" This type of questioning only lasts a few minutes; it does not necessarily reinforce critical thinking skills, and unless limited it can bog down into a monotonous regurgitation of facts.

In Socratic questioning, the teacher asks a series of questions that force the student to defend a claim. This essential step ensures that the POL involves critical thinking. It is inspired by the dialectical method in Plato's dialogues. The teacher opens with a question, the student responds, and the teacher asks another question based on that response. This back and forth continues until the student realizes that his reasoning is flawed, or not.

This process resembles the tying and unraveling of a knot. Prodded by the teacher's questioning, the student will sometimes get stuck, unable to defend her reasoning. The teacher then helps the student unravel the knot by asking another series of questions, or by assigning a follow-up writing assignment that modifies the argument or rethinks the claim entirely.

In the following example, a student defends his claim that egalitarianism is the most just social philosophy. The teacher asks a question about an area of interest for the student—sports—in order to make connections with ideas studied in class.

Teacher: Do you believe the salaries of professional athletes are

morally justified?

Student: Albert Pujols just signed that big contract with the Angels and he takes up 1/10 of the MLB paycheck. I don't think you need 300 million dollars, or whatever it is. They don't need as much as they get. I'd be fine playing for a million.

Teacher: Okay, so, what's an idea that can be used to make an argument that they shouldn't be paid that much?

Student: They don't deserve it. They were born lucky. It's all luck.

Teacher: Really? Doesn't Pujols take batting practice? Doesn't he work hard?

Student: I'm sure he does, but how should I put it … I think it's more like he doesn't do as much work as others do. My neighbor has three jobs and he doesn't make nearly as much. It's not fair.

Teacher: Can you think of a situation in which it would be fair for Pujols to make that much money?

Student: If it benefits the disadvantaged.

Teacher: John Rawls called that the difference principle. Is that what's happening now?

Student: Not really, but people like to watch him. You can say they benefit from that.

Teacher: You started by saying athletes don't deserve to make that much money, but then you said that they can make a lot of money if they follow the difference principle. Now, how can we apply that to your case study regarding water in Haiti? How can egalitarianism help Haiti?

Student: In Haiti, people don't have homes or jobs after the earthquake. Egalitarianism can help make sure everyone has jobs.

Teacher: You might have to invest money for education and create incentives for companies to do business there. That would cost money.

Where would it come from?

Student: I'm not sure. Maybe we could give money to them. From taxes or charity.

Teacher: Why should I have to pay taxes for the Haitian people? Forcing me to pay taxes for something I don't care about is a violation of my right to benefit from my own labor. What's your response to that?

Student: I don't know.

Teacher: Think about it. We will continue talking about this in the debrief.

At least two things are accomplished through this line of questioning. First, the student has to defend a claim using reasoning and evidence, which is the most fundamental aspect of critical thinking. The teacher's questioning provides counter-claims with which the student does not agree and to which the student must respond. Second, the student applies general concepts to specific cases, and must be prepared to defend the efficacy of those concepts in support of his claim.

In the above example, the student was asked to apply the difference principle to a case we did not study in class, but which he studied on his own—the water crisis in Haiti. And there's the rub. It's one thing to defend an argument that has already been made, but since the goal is to learn how to think and not regurgitate previous arguments, the student is asked to apply concepts and argument skills to other examples. In this case, the student was asked to follow up in writing, but if more time were available the teacher could continue his line of questioning until the knot, previously tied, becomes unraveled.

3. Open Discussion

A 15-minute round of open discussion follows the last round of Q&A / Socratic questioning. This is where the panelists, parents, and guests come into play. The opening question is the guiding question of the project. In our most recent project we asked, "What is the best solution to the problem of overconsumption?" but the students carry the primary responsibility for keeping the discussion going once the question is asked.

This process benefits from student panelists reading each other's written work and coming their panel prepared to ask each other questions. This phase is similar to a Socratic seminar, except that the students' written work, and not an outside text, is the focus of the discussion. The same critical thinking skills that were demonstrated during Socratic questioning apply during this phase of the POL, but with a much looser structure that allows students and parents more flexibility to explore their own questions and ideas.

4. Debrief and Follow-Up Paragraphs

Teachers debrief with students immediately following the open discussion—at the same table, with the same panel. A critical thinking debrief often involves the teacher informing a student that he or she holds contradictory ideas. The teacher then asks the student to write a paragraph that explains why the teacher is wrong or to make a claim that is not contradictory In the above example of teacher-student dialogue, when it came time for debrief, the teacher reiterated the question about being forced to pay taxes. If the student had been able to answer the question, that would have been the end of it. Because he could not, he was asked to write a follow-up paragraph.

Debriefs and follow-up paragraphs are fundamental to critical-thinking POLs. There is usually not enough time for students to fully think through a problem during the panel; this last step allows them to reassess their own ideas and pursue new possibilities. Critical-thinking POLs are not completed until two days after the debrief, when the follow-up paragraphs are due.

Pitfalls

Here are some things to be aware of when initiating POLs for critical thinking:

- This is a time consuming process. If POLs are part of your school culture, faculty and schedule flexibility are important.

- POLs of this kind can be exhausting. Teachers must pace themselves and develop strategies with teaching partner(s), e.g., scheduling breaks, being strict with time constraints, or having another teacher with whom you can alternate asking the more

probing questions. Too many adults can dilute conversation and take away from student interaction; however, the participation of thoughtful parents or other adults can help lighten the load for the teachers who are moderating.

- Be like Socrates and push students' thinking, but don't be confrontational the way Socrates often was. Knowing the student will give the teacher a good sense of how far to push.

- Balance speaking with listening. The Q&A and discussion are a give and take. Striking this balance will keep things focused and rigorous while maintaining a student-centered environment.

- Don't allow an eager parent to distract you from pursuing a line of reasoning with a student. Teachers might invite parents to participate in the open discussion, and ask that they not interrupt during Q&A or Socratic questioning.

Conclusion

There are no simple solutions to preparing high school students for post-secondary education, but considering the importance of analytical skills for college and beyond, a close look at critical thinking is an important first step. While the teaching of critical thinking is a multi-faceted issue, a simple principle can guide us: ask students to do it. Do it in writing, do it in reading, and do it in every class and in every project. Undoubtedly, this is easier said than done and raises problematic questions of its own; but one place where it can come together is during a presentation of learning. Students are asked to apply ideas from various disciplinary perspectives, apply those ideas to different scenarios, and defend them by responding to the counter-claims of teachers, parents, and students. If we know the semester will end in this type of endeavor, the course of the semester becomes an analytical exercise in preparation for it. This is not about making up for a problem at the collegiate level, but to acknowledge that learning how to think is a life-long endeavor for all of us. If we—a community of educators, parents, and students—do enough of it, in a disciplined enough way, we might find ourselves on a "journey of self discovery" where we "see where our thoughts are coming from." And yes, somewhere along that path our graduates just might find that English Comp. 101 is not so intimidating after all.

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I Want to Be a Leader Who...

Melissa Agudelo
High Tech High Media Arts

I want to be a Leader who…
Always puts kids first
Hires teachers who are well-versed
Submersed in the murky waters of education
Head first

I want to meet frequently and collaborate professionally
But never take what kids do or don't do personally
I want to spend tons of time in classrooms
Watching with a student's eye
Be much more than just the bad guy
I want everyone to believe they can just drop by
I'll be both ally and gadfly—(depending on the situation)
When I see a need I want to convene student's parents and teachers
I want to breed a collective voice to succeed

I want everyone to know I don't have the answers
But when it comes to love, I exceed expectations
I need to know the name of every student who walks the halls
Because to prevent brawls, I want them to have someone safe to call
Someone to stand behind it all
I want to lead so the STUDENTS stand tall

Willing to handle any curve ball
I'll be that load bearing wall
I want to know what is happening in every room
And never assume
I want to collaborate so ideas bloom
And if needed, I'll even push a broom

I want everyone to see me as just another warrior in the trench
Never one to ride the bench
I'll hand you the wrench or investigate that weird stench
I want to clear the way so teachers can teach
So they can always push kids to reach
And personalize their lessons because they know so much about each
I want there to be no cracks
Because we've spackled the inside track and removed any slack
I want to constantly think about students first
I want inequities in education reversed
So I want to be the leader willing to handle the worst.
Yeah, I know I am too idealistic
Unrealistic
Simplistic
But I want to be a leader who figures out the hardest stuff
I want the kids and the neighborhood to be tough
I want to ask myself EVERY DAY—are we doing enough?

contributors

Melissa Agudelo is the Dean of Students at High Tech High Media Arts. She has worked at the High Tech Village since the fall of 2007 and has taught 11th grade humanities as well as having served as Dean. Melissa attended the University of Mary Washington and is currently pursuing her masters in School Leadership through the HTH GSE program.

Kiera Chase is working on her Ph.D. in Special Education at SFSU and has worked for a number of charter schools including Envision Education, where she is currently designing Blended Learning programs that prioritize the integration of technology to serve all students.

Susan Foley has taught at University Child Development School (UCDS) in Seattle, WA since 1997 and currently teaches in the Early Elementary School.

Gretchen Morse has taught at University Child Development School (UCDS) for more than 25 years and currently teaches in the fourth and fifth grades.

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Cindy Jenson-Elliott is a teacher, writer, environmental educator and a 2012 Fellow of the San Diego Area Writing Project. She is Garden Coordinator at Explorer Elementary Charter School.

Don Mackay has been teaching science and math at High Tech High International for five years. An alumnus of Arizona State University (BA in chemistry) and University of California, San Diego (MS and PhD in chemical physics), he has been developing science education curricula professionally for 20 years.

Ewan McIntosh is a former high school French and German teacher who worked as Scotland's National Advisor for Learning and Technology Futures before a stint in the media industry as Digital Commissioner at Channel 4 Television Corporation. He now brings lessons from the creative industries to schools in Europe, Africa, Australia and North America.

Katie Michaels is a 5th Grade Reading and Writing Teacher at DC Prep. She also serves as the Writing Department Chair, working with literacy teachers to develop curriculum and instructional practice.

Katie Morrison is the Science Specialist at University Child Development School. She has worked at UCDS since 2001. She received her Ph.D. in Molecular and Cellular Biology from the University of Washington and the Fred Hutchinson Cancer Research Center.

Amy Reising, an educator with more than 20 years of experience, has served since 2007 as the Director of Credentialing and Teacher Development at San Diego's High Tech High. She oversees administrative duties related to new teacher preparation and credentialing for HTH schools and numerous local charter schools.

Zoltan Sarda has been an elementary classroom teacher for more than 20 years, half of that time teaching upper elementary, and half teaching Kindergarten and first grade. Currently, Zoltan is the Assistant Director of Credentialing and Teacher Development at High Tech High. He holds a B.A. in History, and an M.A. and Ph.D. in Teaching and Learning from UC San Diego.

Tina Schuster Chavez is in her twelfth year of teaching, and her fourth year with the High Tech High Schools. She started her teaching career in the Peace Corps in Namibia and continued teaching in Virginia and the Dominican Republic until she found her way to San Diego. Currently she teaches Government & Politics to 12th graders.

Bobby Shaddox teaches 6th grade Humanities at High Tech Middle. Previously, he worked as a graphic designer and taught English at the University of Guanajuato, Mexico. Bobby is currently earning his M.Ed. in the HTH GSE Teacher Leadership program, where he is conducting action research on collaborative design and democratic methods in project-based learning.

Daisy Sharrock studied biochemistry at the University of British Columbia and is currently in her fourth year of teaching chemistry at the Jerri-Ann Jacobs High Tech High. She is pursuing her M.Ed in the HTH GSE Teacher Leadership program, where she is exploring mindset in scientific inquiry.

Matt Swanson teaches music at University Child Development School. He earned his M.Ed. in curriculum and instruction from the University of Washington, where he is also currently pursuing a Ph.D. in music education. Previously, Matt served as an elementary classroom teacher, in addition to leading service learning programs abroad for high school students. He is currently conducting research on musical creativity and multicultural education.

Dan Wise is a 10th Grade Humanities teacher at High Tech High and a graduate of the School Leadership program at High Tech High's Graduate School of Education. Before joining the High Tech High faculty in 2009, Dan taught English for five years in the New York City public school system and was a Teach for America corps member.

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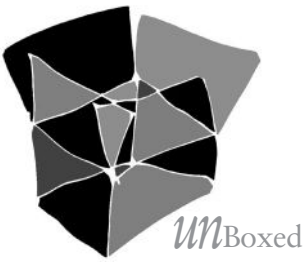

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