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Above: Deconstructed Human, from "The Elements of Surprise," a collaborative art project in which cubism and surrealism collide, created by twelfth graders at High Tech High International.

Cover: Detail from the same artwork.

Welcome

In May 2017, High Tech High Chula Vista hosted the "Bridge to College and Career Conference." It was a conference for high school seniors, who would be graduating in less than a month. It featured panel discussions on making the adjustment to college, financial literacy, how to take part in study abroad programs, and more. It also had exceptionally good catering. And the whole thing, from the catering, to the speakers, to the scheduling, was run by a high school senior—Dayan Corral, a member of my advisory.

I was reminded of this because High Tech High Chula Vista just hosted a "CollegePalooza" for students. I got in touch with some of my old colleagues, and asked "Didn't Dayan invent this?" They set me straight: Dayan's event was a conference, not a festival, and it was in the spring. And, yes, it was still happening. It had gone on hiatus at the height of the pandemic, but it came back last year, and each year it gets organized by a member of the senior class. Michelle Alderete, one of the college counselors at High Tech High Chula Vista, told me that the "financial literacy" panel continues to be a big hit, and last year they added a mental health panel in partnership with the University of California San Diego Department of Psychiatry.

After I talked to Michelle, I gave Dayan a call to ask what she remembered about it. She told me she'd recently taken a look at her emails and documents from that time, she has no idea how she managed to organize such a

complicated event. She also told me that the office of the registrar at San Diego State University, where she works now, is implementing lots of things that she originally did at High Tech High Chula Vista.

I got to thinking about the conference because one of the requests we get most often from teachers is for resources to help with empowering students, and elevating "student voice" in the classroom. Now, I don't want to make this sound too easy (it really isn't) but Dayan's conference is a reminder that sometimes the best way to empower students is simply to trust them, and get out of their way.

This issue is packed with student empowerment! Aneesa Jamal tells the story of a math teacher in India who turned her elementary math classes into extended discussions—with the result that a fourth grader developed her own original divisibility rule for the number seven! Sean Gilley shares a how he used a simple weekly survey to give students a say in how his class works, Joaquín Ramírez Ramírez discusses some students' reluctance to adjust to a more free and open-ended way of learning, Kurt Wootton and Eileen Landay offer lots of techniques for building classroom community, James Fester shares some of the many ways teachers can collaborate with parks, Krista Galleberg empowers her students as readers, and Robert Kuhl reminds us that the most important component of any learning space is the relationships within it.

We've got teacher empowerment in this issue too! Sandra Park and Kate Hogan share how school districts in California are bringing too-often-siloed staff members together to tackle big problems, Aurora Kushner, Jonny Soto-Altrogge, and Julie Benns have a tool to help you diagnose what's missing from your school improvement project, and Ben Daley is bringing everyone together.

But that's not all! This issue also has a piece that I wrote myself! It's about how if you really want to empower your students and bring radical democracy to your classroom there's no better historical model to follow than (believe it or not) pirate ships!

Thanks for joining us!

Alec Patton
Editor-in-chief

Robert Kuhl, former director of High Tech High Media Arts

The Six Relationships that Characterize Great Schools

Robert Kuhl
Kuhl Learning

Introduction by Melissa Agudelo
Lincoln High School

The first element of true love is loving kindness. The essence of loving kindness is being able to offer happiness. You can be the sunshine for another person. You can't offer happiness until you have it for yourself. So build a home inside by accepting yourself and learning to love and heal yourself."

—Thích Nhất Hạnh, How to Love

Robert Kuhl lived by embodying loving kindness. A lifelong educator, Robert focused on understanding and practicing deep relationships in all aspects of his work, in service of creating spaces for healthy learning. This article, with its focus on six relationships situated both inside and outside of the school building, reflects his fundamental approach to school leadership: we will be unable to impact outcomes or lives until we know each other and our students well.

Robert Kuhl was an inspiring educator and extraordinary leader, and it was my privilege to have served alongside him as dean of students while he was director of High Tech High Media Arts, a position he held from 2006 to 2017. His impact on my life is deep and profound—an experience shared by many. Robert lived according to a philosophy of deep connection and relational empowerment, and although he passed in July 2023, his impact on education will continue well beyond his terrestrial days.

—Melissa Agudelo
Lincoln High School

Over the past decade I have interacted with hundreds if not thousands of visitors at High Tech High. So many have asked how they could do Project-based Learning in their schools. After a bit more questioning I would often find that they were looking for something more comprehensive than just projects. They were looking to transform the culture of their schools through comprehensive Deeper Learning.

Underlying Deeper Learning are the relationships that make learning meaningful and sticky. In my many conversations with guests it became evident that in every educational setting some relationships were strong and others needed attention. In some schools, adult-student relationships were strong; students were known well. In others, parent-school relationships were strong; parents were actively involved in their children's education. Through these conversations I developed a framework for reflection on the Six Relationships. Using this tool can help a school identify strengths upon which to build and areas in need of attention.

To be clear, many of these ideas were borrowed from others, especially Rob Riordan from High Tech High and Elliot Washor from Big Picture Learning. I do not claim any of them as my own; I have simply compiled them in one place.

The Six Relationships: What They Are

Three Internal

Student and Student—In great schools students know one another and work together.

What this looks like:

Students do group work and have concrete assigned roles and norms of interaction. The "how" of the group is as important as the "what."

Students engage in constructive kind, helpful, and specific critique.

Students grow comfortable working with anyone in the classroom.

Adult and Student—In great schools students are known well by one or more adults.

What this looks like:

Students report that their teachers care about them.

Adults notice when a student is "off" and have empathetic conversations.

Adults give concrete, specific feedback that is personalized.

Instead of trying to reach the student through the text (the content and ideas in the curriculum) the adults know the students well and reach the text through the relationship with the students. One way to do this is to treat student experience itself as text. Another way is to engage in respectful dialogue about what and how students are thinking.

Adult and Adult—According to Roland Barth, "the nature of relationships among the adults within a school has a greater influence on the character and quality of that school and on student accomplishment than anything else."

What this looks like:

Adults engage with one another about their practice through dialogue and co-planning. This could be through the use of dilemma or project-tuning protocols in a staff meeting and/or more informal problem solving at lunch.

Adults celebrate one another through shout outs and by attending each other's exhibitions of student work.

Adults take a solution-oriented approach when conflict arises, rather than reverting to gossip and triangulation.

Three External

School and Community—How well does the school engage the community as a resource and/or audience for student work?

What this might look like:

A school creates a field guide to a locally important natural area.

Students interview veterans and celebrate their stories in a publication and an event at a local museum.

Students build model submersible autonomous vehicles for the the navy.

Above: Robert, with his advisory class at HTHMA in 2015.

School and Home—How well are the school and families integrated to support students? How well does the school understand the homes its students come from?

What this might look like:

Home visits: A student's advisor does a home visit when the student is new to the school.

Exhibitions: Whether at school or in the community, parents attend exhibitions of student work.

Student-led Conferences: Parents and teachers attend conferences that are led by the student and grounded in evidence of the student's growth.

Work in School and Work in the Adult World—How closely does the work students do in school approximate the work done by adults?

What this might look like:

Students use publishing company structures to self-publish books.

Students design and build custom tiny homes for local artists.

Students build and sell sail boats.

Students write and perform plays about the demise of the honey bee.

The Six Relationship: What They Are Not

This is not the only lens through which to look at one's school or at project-based learning. It is, I have found, a productive place to start thinking about transforming a school and a helpful framework for efforts to continually improve. It is also not simply about what questions are asked or interventions taken—it's about who asks, and who acts. It's a question of culture.

Above: A variety of pieces of art from students in a full-inclusion school.

Using Continuous Improvement to Streamline the IEP Process

Sandra Park
The Improvement Collective

Kate Hogan
El Dorado County Office of Education

The System Improvement Leads Networked Improvement Community includes representatives from Special Education Local Plan Areas (SELPAs), County Offices of Education, and districts from across California.

These participants make up improvement teams of administrators, program specialists, and special ed teachers from Shasta, San Luis Obispo, West Contra Costa, Sonoma, Irvine, and Clovis.

As a totality, these teams are all part of a Networked Improvement Community (NIC) sponsored by the System Improvement Leads project (SIL), a collaborative grant project between the Riverside County SELPA, the El Dorado County SELPA, and the El Dorado County Office of Education.[1] The SIL project is supported by the California Department of Education (CDE) and the California Collaborative for Educational Excellence (CCEE).

Our goal

The SIL NIC holds the collective belief that IEP goals are the heart of the educational program for students with disabilities. They believe that it is possible to improve the system design so that 100% of IEP goals can be

achieved, setting students up for a lifetime of access and success. The goal is to increase the percentage of IEP goals met from 38.5% to 100% by June 2026.

Investigating the Problem

To begin, the improvement teams within SIL NIC created process maps to illuminate how teachers and administrators enacted the IEP process and conducted empathy interviews with teachers, parents, and students to gather qualitative data to document their thoughts and feelings about the IEP process and its effect on their students. Finally, they mined data from individual IEP reports to illuminate potential sources of variation in IEP goal documentation and quality.

Through an investigation of the system, teams developed both a clearer and more complicated view of the IEP process. This process also highlighted for leaders how little they actually knew about the intricacies of their systems, an eye-opening and humbling experience. For example, the IEP process at individual sites varied wildly, leaving teachers to navigate it for themselves. As a result, what was considered a high-quality IEP goal also varied. In addition, some teams were shocked to discover the number of IEPs without documented goals when reviewing individual IEP reports. But more problematic was the fact that they had to review a sample of reports one by one since they couldn't easily access this data from the Special Education Information System (SEIS). More importantly, it underscored the value and importance of systems thinking in uncovering the contributing factors to the problem that were previously unseen.

In addition, during the investigation period of this project, the Shasta SELPA and County Office of Education discovered that only 73% of IEP goals were marked "met" or "not met". Without this, there is no official record of student progress. The teams found the motivation to move the needle for students by investigating their current reality.

Approaching the work with curiosity and humility has not only provided teams with a better understanding of their systems but has also shifted leaders' relationships with their colleagues. As one program specialist noted,

> I've had a shift in my thinking around collaboration and working in a group, like active listening to [teachers] who have perspectives that I may not understand or may not have valued as much. I notice a difference in my professional relationships that has been really positive.

A SELPA administrator at another district also commented on how the nature of the work has shifted her interactions with teachers and program specialists:

> We have had to build a relationship with them in a different way because we're saying 'Here's what we're working on, we really need your help. Here's where we screwed up, here's where we did well, we need your lens.' It's been a good partnership not just for growth but for those relationships in the district.

Testing potential solutions

After investigating their local systems, teams began using the Plan-Do-Study-Act (PDSA) cycle to try out potential "change ideas" to improve the IEP goal-setting and reporting process. These have included a rubric to evaluate the quality of IEP goals and a checklist tied to the IEP process. A PDSA is a mini-experiment used to test ideas out in practice. In the early stages of testing, teams often, but not always, try out ideas on a small scale; for example, one teacher with one student. Here, the goal is to learn about the feasibility of a change idea: Can it even be done in practice? If so, does it produce the desired outcome? What are potential challenges that might need to be addressed? Ideas that show promise are then tested on a larger scale to learn how to adapt them to different contexts and then finally how to implement them across the entire system.

Once Shasta had knowledge that only 73% of goals were marked met or not met, they quickly tested their change idea to improve this outcome. They developed a high-quality IEP checklist, including specifics for IEP goals, trained their case managers, and engaged in routine data collection. By November 2021, they found that 99% of goals were marked met or not met; a drastic improvement thanks to their PDSA cycles as well as resource sharing within the Network Improvement Community. Several teams were prototyping and testing IEP checklists and by combining resources, teams knew they were rolling out the best of the best for their students.

Meanwhile, the Clovis school district worked diligently to design a data collection system that would be feasible for staff and gather the relevant data needed to work towards improvement for students. Initially, they were collecting far too much data and it was taking team members an unreasonable amount of time to complete. Throughout several PDSA cycles, they honed their system, gathered only the necessary data for improvement, and remained firm on the fact that staff needed a reasonable task in order to make this work sustainable.

Conducting small-scale experiments using scientific reasoning and evidence represents a major shift in how network members have approached reform efforts in the past. At first, some leaders were impatient with the process, wanting to move to full-scale implementation as quickly as possible. However, they soon discovered how much learning happens with each PDSA and how much more confidence they have in spreading ideas that have been vetted

Above: An educator practices conducting an empathy interview in a professional learning workshop.

through early testing.

One assistant of special education especially appreciated the time devoted to inquiry, though initially they had found it frustrating:

> I've been in special education for 22-23 years. Everybody always has these great ideas and I've been part of many teams where those great ideas have been put in place without much inquiry. But many [of these] programs haven't lasted. What's exciting to me is all the nitty gritty work that we do [in the PDSAs]. At first, we wondered, 'Why are we taking so long? Why are you making us do that [cycle] again?' Every time we did a PDSA, we would [tell our coach], 'We just did that but just a little bit different.' But we totally get it now. Seeing those small improvements we make every week is super exciting.

PDSAs also challenge the push for full-scale implementation when they reveal that an idea doesn't work. For example, when testing a specific change idea and reviewing the data, one team discovered that the idea wasn't as helpful as they thought it would be. Abandoning the idea, however, wasn't easy. In the words of one team member,

> It was hard to accept that we thought was working wasn't really helping that much. [We're] so used to just continuing with something because that's what we've done, and it's a huge shift to be in a space where once we get information that something's not working, it's okay to just move on and abandon it.

For many teams, the use of data or evidence as part of the PDSAs distinguishes it from other forms of inquiry and reform efforts in general. A program specialist had this to say:

> There are so many books and leaders on educational reform and change theory, [but] none of it is like this. There are tons of pieces, structures, and theories that this work incorporates, but this stands out as being very different. The differentiating point is those PDSAs. They're a more structured approach to looking at data, which allows for more disciplined inquiry.

Most notably, the program specialist contrasted this process with how "data" is more commonly used. In the words of one,

> We always talk about making data-based decisions but in reality, we typically don't. We typically hear from maybe a few stakeholders and they bring some subjective information to the table and then we make decisions about support and professional development based on that.

Next Steps

As the SIL NIC continues this work, they are focused on adding additional teams to the network in service of scaling the promising change ideas and continuing to learn and innovate. So far, the network has increased the percentage of IEP goals met from 38.5% to 56%. Scaling this work will increase the number of students who are positively impacted. In September 2023, four additional teams from across the state joined the network.

As teams reach improvement on the initial driver of IEP Process, they are moving on to tackle Inclusive Practices and Chronic Absenteeism as we work towards ensuring students meet 100% of their IEP goals.

Takeaways

In most organizations, leaders are considered the experts. They come up with solutions to problems and ask their employees to implement them. However, this style of leadership no longer meets the complexity and fast-paced nature of today's world. Instead, leaders must create learning environments that draw on the expertise of everyone in their organizations and value learning through experimentation and failure.

To do this, leaders must think and behave differently. In Transforming Educational Systems Toward Continuous Improvement: A Reflection Guide for K-12 Executive Leaders, Dixon, and Palmer identify key dispositions and core practices of such leaders, who they identify as improvement leaders. First, improvement leaders have a growth mindset and see every individual in their organization as valuable and contributing members with the capacity to learn and develop. Second, they are curious, humble, and vulnerable; they recognize they do not have all the answers, are open to feedback, and are willing to be wrong. In addition, these leaders are comfortable with uncertainty, recognizing that learning is a messy process where answers aren't always readily available. They try out possible answers using scientific reasoning and rely on concrete evidence that something works before scaling it across the organization. Finally, improvement leaders are systems thinkers who see interconnections across different departments and lines of work.

In addition to these values and characteristics, the SIL NIC has the opportunity to build upon the work of social justice advocates, community organizers, and improvement theorists from our past and present. Brandi Hinnant Crawford perfectly voices this connection as she states "Everything about me is rooted in justice. I wouldn't touch improvement science if I didn't think it could lead to justice. Because I don't have time for nothing else." Septima Poinsette Clark's work supports Black Americans' access to literacy and forged the way for the Civil Rights movement to push for voting

and basic civil rights. As Ella Baker says, "Give light and people will find the way." These great improvers teach us that work focused on justice paves the way for lasting improvement. We are grateful to build upon these improvers and leverage what we know works. We continue to be optimistic about how engaging in this work influences how users engage in schools day to day.

For many network members in the SIL NIC, their approach to leadership and other change efforts in their organizations has shifted profoundly. They are looking at their systems with a more critical eye, seeking out the knowledge and expertise of others in their organizations, embracing failure as a valuable part of learning, and testing and vetting ideas with more discipline and rigor. In short, they are becoming the improvement leaders we need to transform our systems to serve all of our students.

Notes

1. The broad goal of the SIL is to increase the capacity of COEs, SELPAs and LEAs in continuous improvement, data best practices, and high leverage change ideas in order to improve outcomes for students with disabilities.

Above: Students share during Crew Lesson

A Troubleshooting Tool for School Improvement
Our Variation on the Lippitt-Knoster Model

Aurora Kushner, Jonny Soto-Altrogge, and Julie Benns
NYC Outward Bound Schools

It was Friday at South Brooklyn Community High School (SBCHS), a transfer school in Red Hook, which means it was Crew day. Jonny, a "Crew Coach" at NYC Outward Bound Schools, had worked with staff at SBCHS to design Friday's Crew lesson to be both fun and collaborative, as well as introspective. He was on site at SBCHS, eager to observe how things were going during the Crew implementation process.

Students at SBCHS had come to love Crew—a supercharged version of advisory, a typically non-academic class period in which groups of eight to 15 students met for 55 minute sessions once a week, with an additional Crew advisory check in every day during the first period. So there was a feeling of excitement as the Friday Crew session kicked off with an interactive and competitive name game. Students across all Crews got into the game, and the energy only increased as time went on.

After this opener, students moved on to the reflective part of the lesson. They wrote on post-it notes the hopes and fears they have in the short term (the remainder of the school year) and in the long term (the next five years), and to stick them on the wall. The first Crew Jonny observed took to the task with a quiet fervor. Students took turns reading out the hopes and fears posted on the wall and sharing connections with other students, as well as offering words of encouragement and support when needed.

When Jonny visited another Crew classroom, the energy was very different. While this Crew had indeed added their post-its to the wall, the students were sitting down quietly and no longer participating or offering encouragement and support to one another, despite the Crew Advisor's best efforts to elicit engagement. Jonny realized that while the structure and lesson planning of Crew were in place in both classrooms, there were gaps in implementation and facilitation for this Crew. Throughout the school, Jonny noticed the same phenomenon: though everyone was following the same plan, the results were highly variable—with varying levels of effectiveness. Clearly, there was still work to be done.

An Updated Tool for Troubleshooting Improvement

Improving conditions for young people in schools is complex work, and day to day, it can be easy for educators to get stuck in the implementation of practices or policies and lose sight of why we're doing the work. NYC Outward Bound Schools is a nonprofit that partners with public schools to problem solve and respond to challenges within their systems. Over the past two years, we've led an improvement network of 50 schools who are looking to increase a sense of belonging in their school communities by implementing Crew, the signature advisory structure in all NYC Outward Bound schools and schools in the national EL Education network, which has its roots in Outward Bound.

Through this work, we've developed a new version of the Lippitt-Knoster model—a visual tool used to manage complex change—that is specifically designed to support school leaders, teams and networks as they work towards improvement for equity (see Figure 1).

During our first year of Crew Initiative, NYC Outward Bound Schools was flying the plane while building it—our whole team was new, our partners were new to working with us, and the idea of an improvement network was new. In order to clarify the work, we divided up the 50 schools into smaller cohorts based on their entry point. For instance, schools who already had an advisory, but were looking to revitalize it coming out of the pandemic were grouped together, and schools just starting the Crew journey were grouped together.

As we mentioned before, "Crew" is a type of advisory—a concept by no means unique to NYC Outward Bound Schools. The term Crew was coined by Outward Bound founder Kurt Hahn, who famously stated, "we are crew, not passengers." This phrase has become the unofficial motto of our schools and EL schools that utilize Crew as a structure to promote a sense of belonging and agency among students. Other schools boast similar structures like town hall, morning meeting, or family group.

What differentiates Crew is the fact that it is both a structure to support the

Above: Students in a Crew classroom.

development of collaboration, empathy, trust and agency among students, and a word that signifies a community ethos. The spirit of "crew not passengers" demonstrates that we are stronger together than we are individually, and that we're all working toward a common goal. It's not a "quick fix," but we've seen powerful results in student belonging, engagement and academic performance across schools that implement Crew successfully.

We invited Crew Initiative schools to come together during convenings to plan change ideas based on their readiness, but we quickly realized even with similar starting points, the conditions and challenges that schools were facing were unique to each setting. In our second year, we redesigned our groupings so that they were based on common problems of practice—such as Crew Advisors needing more support, a lack of full school engagement in Crew, or a lack of structures in place to support Crew. Through this redesign, schools were able to select change ideas more aligned to their common problems and have similar improvement journeys.

It was through the conversations at our convenings that we realized our Crew Initiative schools were running into myriad challenges in the change process—from staff pushing back against added responsibilities to students not "showing up" emotionally, or sometimes even physically.

Back at South Brooklyn Community High School, for example, leadership and staff struggled to implement some of the ideas coming out of the Crew Initiative program. There seemed to be a pervasive misalignment between the student experience of Crew (positive, as reported in surveys) and the staff experience (much more negative). As we investigated this, we found that the

MANAGING CHANGE TOWARDS EQUITABLE IMPROVEMENT

A variation of the Lippitt-Knoster Model

NYC OUTWARD BOUND SCHOOLS

Transforming Schools, Changing Lives

Building off of the Lippitt-Knoster model, this variation of the model is designed to support hubs, coaches, leaders and teams to problem solve and respond to challenges within their system as they work towards improvement for equity.

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VISION Having an equitable aim to work towards that is clear, transparent & inspiring		**STAKEHOLDER VOICE** Ensuring that students, families, teachers, leaders & coaches are all part of the decision-making process		**STRATEGY** What is the plan for achieving the vision?		**RESOURCES** Suite of tools through which the strategies come alive		**SKILLS** Knowing how to use the resources		**OWNERSHIP** Building collective efficacy in the team working towards improvement for equity		**IMPROVEMENT FOR EQUITY**
X		✓		✓		✓		✓		✓		= Confusion
✓		X		✓		✓		✓		✓		= Maintaining the status quo
✓		✓		X		✓		✓		✓		= Inertia
✓		✓		✓		X		✓		✓		= Anxiety
✓		✓		✓		✓		X		✓		= Resistance
✓		✓		✓		✓		✓		X		= Compliance

Figure 1: The NYC Outward Bound Schools Version of the Lippitt-Knoster Model

issue wasn't philosophical, but logistical: without a consistent calendar, staff weren't sure if scheduled Crew events were happening. There was also an attempt to implement academic support in Crew, but without a consistent strategy or staff plan, the support fell through. Jonny (the "Crew Coach" from the start of the article) and Kelley (the staff member leading the work) felt that communication needed to be more streamlined and believed that these breakdowns in communication would soon impact students.

We knew we had to support schools in managing change. In conversation with Crew Coaches like Jonny, it was clear that not only were schools struggling to think deeply about how to use data in meaningful ways; they were also simply getting stuck in the implementation process. Much of the support we were providing at that point was plugging holes in the dam, tackling each new challenge as it arose. Our network-wide convenings became spaces for venting about issues, with little problem-solving happening. And, we grew worried that as schools got stuck in the implementation process and didn't see a quick fix, they could slide into the "adopt-abandon" cycle that has plagued so many improvement efforts.

We began to think systematically about the challenges. Where were they arising? How could we support schools to think about these challenges through an improvement lens? How could we think about the right conditions for improvement to take hold?

Educator, scholar and improvement expert Dr. Brandi Hinnant Crawford reminds us that there are two key questions to any improvement work: "Who's involved" and "who's impacted?" These questions were central to the work we were doing with schools in the Crew Initiative. We considered how we centered school and student voice in our change ideas, and how we worked with student survey data—but still we struggled to make the improvement work feel manageable. Through several conversations with Crew Coaches and schools, we developed our variation on the Lippitt-Knoster model (Figure 1).

The Lippitt-Knoster model (Figure 2) was first developed by Dr. Mary Lippitt, a leadership consultant in the late 1980s, as a way to support organizations navigating complex change. She suggested that if an organization has the **vision** for where they are headed through the change process, the **skills** needed to implement the change, the **incentives** or motivations to take on the change process, the **resources** to implement and support changes, and an **action plan** for how the change will happen, then the organization will be successful in their change process. Any one missing element will lead to a variety of problems, but if an organization is able to identify which element is missing, they can address the problems and navigate the change process. In 2000, Professor Dr. Tim Knoster added a sixth key area for change: **consensus** in the change and in building a collaborative process. This model has been

Figure 2: The Original Lippitt-Knoster Model

Vision	Consensus	Skills	Incentives	Resources	Action Plan	=Success
	Consensus	Skills	Incentives	Resources	Action Plan	=Confusion
Vision		Skills	Incentives	Resources	Action Plan	=Sabotage
Vision	Consensus		Incentives	Resources	Action Plan	=Anxiety
Vision	Consensus	Skills		Resources	Action Plan	=Resistance
Vision	Consensus	Skills	Incentives		Action Plan	=Frustration
Vision	Consensus	Skills	Incentives	Resources		=False Starts

used by a variety of organizations over time as they manage complex change.

Our model builds off the Lippitt-Knoster model in four important ways:

1. Central to our new model is the idea that stakeholder voice is key to any improvement work, particularly if the improvement work is to be equitable for all students.
2. Our model is a way to diagnose where schools are in the improvement process, acknowledging that there are two things happening at once—one is the learning and implementation of the content (in this case, Crew), and the other is engaging in the continuous improvement process.
3. Our model centers continuous improvement for both the school (client) and coach (provider of services). Without this critical piece, it can be easy for coaches to work with individual schools and lose sight of the overarching network goals and learnings. Instead, we wanted to focus on growing sustainable practices across multiple schools through coherence and alignment. This builds on the learning from Generating Traction with Continuous Improvement (Pace, 2022) which cites one of Coburn's four dimensions of spread: that in order for a reform to gain traction, it must be taken up by increasing numbers of people/schools across a system and embedded into the culture.
4. Our model highlights the importance of collective efficacy that is built as teams work together to shift and improve practices, mindsets and policies in schools. This collective efficacy is important for any practice to take hold and lead to improvements for students.

To understand what this looked like in practice, let's return to Jonny's experience:

Jonny knew he needed to discuss progress with SBCHS and find ways to build momentum in their improvement journey. In preparation for a meeting with SBCHS leadership, Jonny anticipated the school's strengths and areas of growth, and built an agenda that would push folks to be honest and reflect carefully on their progress. With this new model in hand, Jonny sat down

with the school's leadership team to review how they were working to improve Crew implementation at the school, Going through the document column by column, they discussed the vision, how they were engaging stakeholder voice, their strategy for implementing Crew, what resources they liked best, and how they were building coherency and consistency across the team.

Using the document as a note catcher to identify the changes in place illuminated where leadership had thought through their improvement effort, and where they still needed to devote time and energy. For example, the SBCHS leadership team and Crew Guide were able to easily write down their vision for the work, but were stuck on the stakeholders and strategy—it became clear that staff and students hadn't fully adopted vision, mostly because there wasn't a set strategy for the work—leading to some of the inertia. And while staff had the resources and training they needed, their lack of collective efficacy was leading to blind compliance without trust, which was damaging the program's effectiveness as a whole.

Jonny asked everyone at the meeting to verbalize their collective desired outcomes, understanding of the strategy, and hopes for Crew. Using the model together gave them common language and helped them identify the systemic gaps that needed to be addressed, allowing all stakeholders—administrators, teachers, and students—to share the responsibility. As a whole, this pivotal exercise helped the challenges come into focus and provided a roadmap of where to go next.

A Final Thought

Thinking about the model also helped shift network convenings. The Crew Initiative team was able to respond to schools by systemically creating the necessary conditions for success. These conditions still maintained an aspect of connecting over shared challenges, but also included protocols and means to understand the root causes of the challenges, and surfaced potential avenues to address them via collectively determined change ideas.

While improvement work is never easy, the Managing Change for Equitable Improvement Model can help coaches and school partners to lift their gaze, determine where they are strong and where they are in need of attention, and ultimately, create a plan for how to continue towards equitable conditions for all students.

References

Gallagher, H. A., Cottingham, B. W., & O'Meara, K. (2022, July). Generating traction with continuous improvement: Lessons from two learning networks [Report]. Policy Analysis for California Education.

Above: Krista Galleberg awards a spelling certificate to a student

Putting the Science of Reading into Practice
Better Reading Instruction Through Lesson Study

Krista Galleberg
Harvard Graduate School of Education

Adriana is a tall, quirky, Latina ten year old. She lives about 10 miles north of the US/Mexico border and attends the school where I teach, a project-based learning school of choice. Starting spring break of her second grade year, Adriana spent nearly 18 months learning on Zoom due to the high rates of Covid in our neighborhood. She returned to in person learning fall of fourth grade. Her fourth grade teacher noticed that Adriana struggled to write or type, and created a formal plan to monitor Adriana's progress and ensure that she made adequate progress in fourth grade.

At the time, my school was using Fountas and Pinnell assessments, also known as F and P, to monitor students' reading progress.[1] Adriana came into fifth grade reading at a level O, which is a third grade reading level. When it was my turn to test Adriana's reading, I sat down at my kidney bean table with her, picked a small book at level O (a third grade level) and asked her to read. She began to read haltingly. She paused at words longer than six or seven letters, and made lots and lots of mistakes.

Adriana read "grumbled" as "groaned." She read "complainer" as "comma." She paused at "uprooted," and then skipped that word altogether.

After finishing her assessment, I wrote the word "uprooted" on a small

whiteboard. I asked Adriana to sound out the word, letter by letter. She looked at me blankly. I tried again. I covered everything except the prefix "up" with my finger and asked her to read it. She read it correctly. Then I covered up everything except the base word, "root." Adriana did not know what that word said. I asked her what sound the letter "r" made and she got flustered. I asked her what sound "oo" spelled and she told me she didn't know.

I felt a wave of panic. Adriana didn't remember all of her letters and sounds. Yet she was testing on our F and P assessments as an average reader in my classroom. About 30% of my students were reading at a first or second grade level, about 30% were reading at a third grade level, and the last 40% were reading at a fourth or fifth grade level. I'm a fifth grade teacher at High Tech Elementary Chula Vista, a project-based learning school at the border of the United States and Mexico. Our school is a public charter school that mostly serves families of Mexican and Filipino origin. As a classroom teacher, I work with my team to design and teach project-based curriculum based on our own passions and our students' identities and interests. I also participate in lesson study to improve my practice.[2] Lesson study is a team-based professional development in which teachers work together to create a well-crafted lesson that advances student learning and solves a problem of practice.

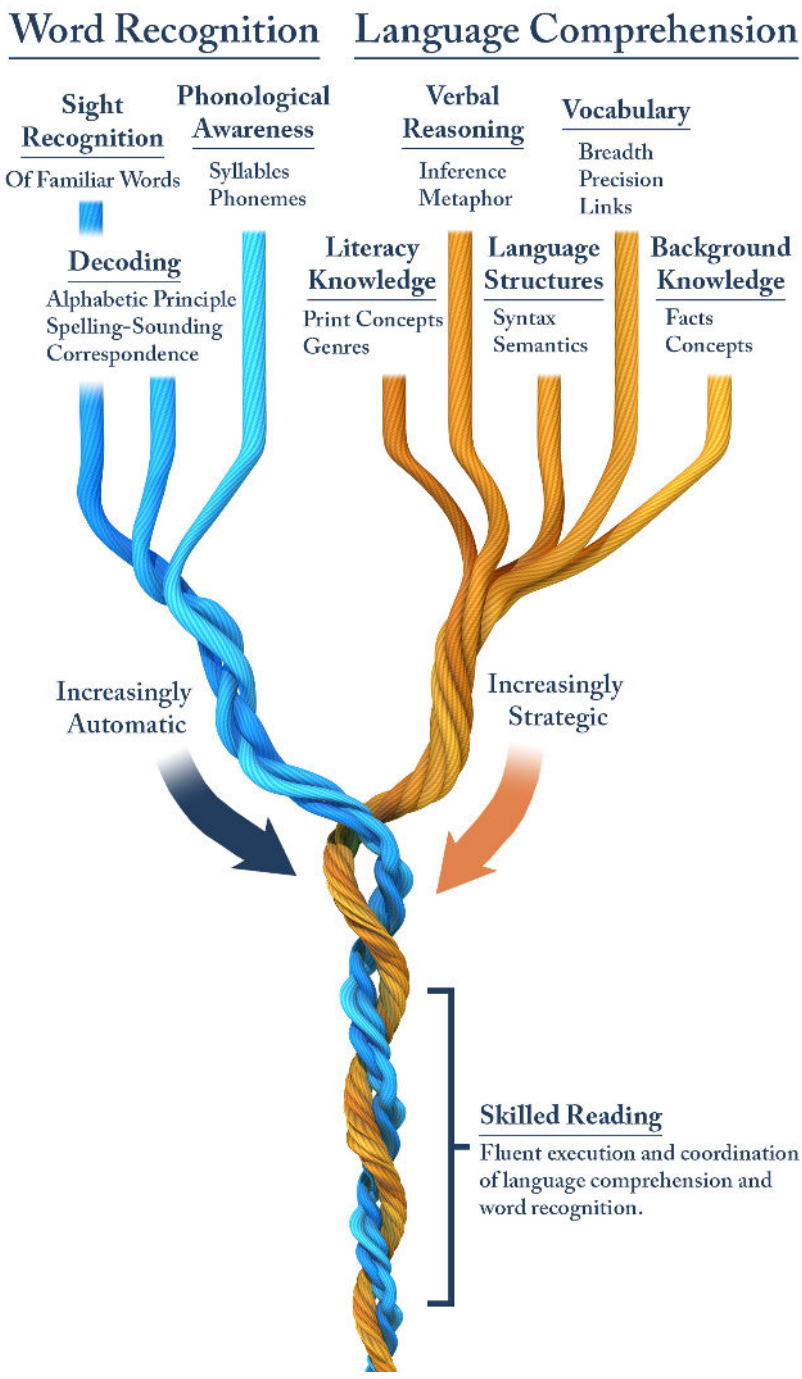
Sold a Story and the Science of Reading

If Adriana's story sounds familiar to you, it's probably because the podcast *Sold a Story* brought new attention to the science of reading, and new public scrutiny to Fountas and Pinnell assessments. Listening to this podcast, along with observing Adriana and other students in her situation, inspired me to explore literacy through my lesson study process. Over the past year, I have engaged in two lesson study cycles about literacy – the first about peer feedback in writing, and the second about improving reading comprehension through morphological awareness.

The science of reading is the set of research and literature from developmental sciences such as psychology, neuroscience and linguistics that investigates how children learn to read (Duke and Cartwright 2021). According to findings from science of reading researchers, there are five main domains of literacy development: phonemic awareness, phonics, vocabulary, fluency, and comprehension.[3] In order to become proficient readers, students must develop competence in each of these literacy domains.

One of the insights from the science of reading is a model developed by Dr. Hollis Scarborough known as "Scarborough's Rope" (Figure 1). Scarborough breaks down various literacy skills that lead to reading proficiency. My lesson study team used these models of reading to understand and analyze our student data.

Figure 1: Scarborough's Rope



Data Collection Drives Lesson Study

My lesson study team collected data on our students' literacy skills in order to identify a problem of practice. First, we assessed our students' phonics and phonemic awareness by administering the *Words Their Way* spelling inventory. This is a progressive spelling program that measures students ability to encode common phonics patterns. Based on this assessment, we saw that the majority of our students could spell (and therefore decode) well.

We also collected information on students' reading comprehension. Based on state and classroom assessments, we could tell that most of our students were reading two or more levels below grade level.

Using the Scarborough's Rope model, we analyzed this literacy data. Our students' spelling data was proficient and their reading data was not proficient, so we deduced that our students were in need of more support in the "language comprehension" strand of Scarborough's model. We decided to focus our lesson study efforts on vocabulary and language structures.

More Data Collection

We spoke with several veteran teachers to understand how to support students with vocabulary and language structures. Rebecca, a veteran special education teacher and reading interventionist, has experience working with older students with dyslexia or other reading challenges.

Through research and discussion with experienced teachers such as Rebecca, we identified morphology as a missing skill. Morphology is the study of how word parts encode meaning. We investigated research on reading comprehension and vocabulary. In one article, the researchers explain that morphology is a helpful strategy for teaching secondary literacy in content areas (Hendrix and Griffen 2017). Morphology is defined as the smallest building block of meaning within words. The authors argued for ongoing rather than isolated morphological instruction as a way to improve vocabulary knowledge, reading comprehension, and spelling skills for upper-elementary to secondary learners. The authors recount four morphological approaches to help students learn the structures of words:

> **Part-to-whole:** if I add the prefix "dis-" which means *not* to the root word "like" then "dislike" must mean *not* like.
>
> **Parts-to-whole:** a- means not, symptom is the root word, -atic makes something an adjective so asymptomatic is an adjective to describe when someone does not have the symptoms of a disease.

Analogy: if nonfiction means something that is not fiction, then nonsense means…(something that does not make sense)

Whole-to-part: starting with the word disagreement, let's first think about the meaning. Disagreement is when there is a fight or you do not agree. So dis- must mean not. And -ment must show that it is a noun, like a fight or an argument.

The most common morphemes that students encounter are prefixes, root words, and suffixes. Teachers can guide students in breaking down the words into their morphemes to glean clues about the word's meaning. For example, imagine that students encounter the word "informational." This word consists of the morphemes *inform*, *-tion*, *-al*. Each morpheme gives a clue about the word's meaning. Another example is breaking down the word "unchangeable." "Un" is a prefix that means "not." Change is the root word which gives the word its main meaning. "Able" is a suffix that means "capable of, fit for, or worthy." If you put these morphemes together, you get "un + change + able = unchangeable." Unchangeable means "not being capable of being changed."

Bringing morphology to students

We had completed the first three steps of the lesson study process. First, we reviewed student data to identify a problem of practice. Next, we studied academic literature to understand our problem of practice from a researcher's lens. Then, we spoke with veteran teachers to understand our problem of practice from a practitioner's lens. Together, these steps had given us a clear roadmap: to support our students' language comprehension, we needed to teach them morphology (prefixes, suffixes and root words).

Next, it was time to interview our students about their understanding of language and of morphology. As part of the lesson student process, I selected three focus students. I was curious to learn more about their thinking and to closely monitor and track their progress over the course of our lesson study project.

When I interviewed these students, I asked them how often they see words inside of words. I asked them to look at the word "informational" and tell me how many words they could see inside of it. I was hoping that they would say words like *in*, *form*, *inform*, *information*, etc. Interestingly, many of my focus students struggled to identify these words inside of informational but were able to see words like *I*, *in*, *for*, *mat*, etc.

Next we did a whole class lesson on morphology, where we worked together to identify word parts in complex words like "informational." After introducing this routine and practicing it, I could see students start to pick up this routine

on their own and break down words into word parts.

Creating a shared lesson

The final step of lesson study was to create a shared lesson. I worked with my lesson study team (a seventh grade humanities teacher and a ninth grade humanities teacher). Together we designed a ninth grade humanities lesson that supported students' morphological development. We used what we learned about morphemes to create one lesson for ninth graders, using the same routines that I use in my fifth grade class.

We used a routine that we found in Hendrix and Griffen's article about supporting morphological development. This routine was:

1. Recognise that you don't have a deep understanding of the meaning of the word.
2. Analyze the word for morphemes you recognise (both roots and suffixes).
3. Hypothesize a meaning for the word based on the word parts.
4. Check the hypothesis against the context.

In our lesson, ninth grade students listened and read along to an engaging, complex text (*Demon Copperhead*, by Barbara Kingsolver). They found one word that they didn't recognize and that was morphologically complex. They wrote that word on an index card, and then they used the routine to break that word into morphemes, hypothesize the meaning, and check the meaning against context. Then, they read an article independently and applied the same routine to words in that article.

Applying Our Lesson Study Findings to My Own Practice

After conducting this lesson study in my colleague's ninth grade humanities class, I began to reflect on my own practice as a fifth grade writing teacher. I saw how my fifth graders' skills needed to build over the next several years towards more advanced word study skills. The most important way that I could support my own students' morphological knowledge was supporting their understanding of common root words, prefixes and suffixes. This is summarized in one of the Common Core standards for language: *CC.5.L.4.b Vocabulary Acquisition and Use: Use common, grade-appropriate Greek and Latin affixes and roots as clues to the meaning of a word (e.g., photograph, photosynthesis).*

For example, each week with my students we complete a word work packet. After finishing this lesson study, I plan to add morphological routines to our

Above: A student reads in class.

word work packet so students can practice breaking down the words into their component parts. I will give my students word lists with prefixes, root words and suffixes so that they will separate the words into prefix-root word-suffix alongside their student-created definition. After completing this lesson study, I have a much deeper understanding of this standard. I understand the research on how affixes and roots (also known as morphemes) help students build their vocabularies, and know several practices for supporting students in building their knowledge of affixes and root words. Finally, I understand how this skill builds from one year to the next, allowing students to tackle progressively more difficult vocabulary.

Reflecting on lesson study

Lesson study has been an amazing opportunity for me to work with teachers outside of my grade level team. My favorite part of lesson study was the opportunity to observe in other teachers' classrooms. This form of professional development allowed me to learn from and teach other teachers.

The most important thing about lesson study was the opportunity to work with teachers in my same discipline. Lesson study works best when teachers share the same disciplinary focus and the same grade level. It works especially well for areas of teaching that have rigorous research, like the science of reading.

I suggest lesson study for administrators looking to disseminate the science of reading practices among their teachers, and transform classroom level practices. This form of professional learning explicitly transforms research into practice, which is perfect for the science of reading (where a clear research consensus exists but there is more variability in the practical approaches of teaching reading).

Notes

1. High Tech High schools no longer use any Fountas and Pinnell assessements.

2. For more on lesson study as a method of professional development, see Murata, A. (2011). Introduction: Conceptual overview of lesson study. Lesson study research and practice in mathematics education: Learning together, 1-12.

3. For more on the science of reading, see Duke, N. K., & Cartwright, K. B. (2021). The science of reading progresses: Communicating advances beyond the simple view of reading. Reading Research Quarterly, 56, S25-S44.

Above: Student read a "choice book" together.

References

Duke, N. K., & Cartwright, K. B. (2021). The science of reading progresses: Communicating advances beyond the simple view of reading. Reading Research Quarterly, 56, S25-S44.

Hendrix, R. A., & Griffin, R. A. (2017). Developing enhanced morphological awareness in adolescent learners. Journal of Adolescent & Adult Literacy, 61(1), 55-63.

Murata, A. (2011). Introduction: Conceptual overview of lesson study. Lesson study research and practice in mathematics education: Learning together, 1-12.

Above: Participants at a workshop in at the 2023 Deeper Learning Conference.

They Have a Point...

Ben Daley
High Tech High GSE

This was originally delivered as a speech to the High Tech High GSE on September 15, 2023

I want to tell you a story. It's a story about innovation. It's a story about improvement. It's a story about equity.

As far as I can tell, there are these three camps in education: an innovation camp, an improvement camp, and an equity camp. And each camp has an important point to make.

We do need more innovative teaching and learning in schools. We do need more innovative school models. We do need more deeper learning, more collaboration, and critical thinking, communication. We do need more 21st century skills. We do need more personalization, and real world connection. We do need an ethic of excellence where kids produce multiple drafts so they can do their best work. Those innovation people—they have a point.

We do need more systematic improvement. We do need to understand root causes and see the system. We do need to set measurable aims ("how much by when?" "Some is not a number; soon is not a time"). We do need to say "and why is that? And why is that? And why is that?" We do need to understand variation, so that we can learn and so that we can spread what works. Those improvement people—they have a point.

Above: Educators collaboratively draft goals for equity-focused improvement projects.

We do need more equitable schools. We do need to interrogate self, others, and systems. We do need to examine how we show up. How our identities impact how we interact with others. How our identities impact our relationships with students and colleagues. How our behaviors make our students and colleagues feel a greater sense of belonging or not. Those equity people—they have a point.

It seems to me that if we want to keep students at the center and improve schools, we need the best of innovation. We need the best of improvement. We need the best of equity. We need the speakers, the thinkers, the authors, the mindsets, and the tools. This seems kind of obvious to me.

But! These camps have a hard time talking to one another, because they really want to point out what is wrong with the other camps.[1]

Talk to innovation people. They'll tell you that improvement people are too technical. Too focused on small problems. Missing the big picture. They'll tell you equity people are sometimes focused on lecturing to kids about social justice, but forgetting to teach in socially just ways. Those innovation people—they have a point.

Talk to equity people. They'll tell you innovation people and improvement people don't get it. They'll point out that too often, innovation people and improvement people say they want to close gaps by race, but they don't want to talk about race. Those equity people—they have a point.

Talk to improvement people. They'll tell you innovation people and equity people are well meaning, but question how they are going to reach their aims. They'll tell you that innovation people and equity people have "miracle goals, but no methods." Those improvement people—they have a point.

To me, if you're an improvement person, and you're doing some improvement projects, but you never get past improving logistical issues, and you never get to more ambitious teaching and learning, and you don't really feel comfortable talking about race, something has gone wrong.

And if you're an innovation person or you're an equity person, and you're doing project based learning, and you're examining self, others, and systems, and someone says, "How do you know if what you're doing is making things better?" And you say, "Well, it's kind of hard to know…" Something has gone wrong.

So, my charge to you. If you find yourself drawn to one of these camps… If you are more of an "improvement person" or an "innovation person" or an "equity person," push yourself to learn from these other camps. If you're an equity person, attend an improvement event or read an innovation book. How can you integrate the best of the other camps into your practice?

Notes

1. Editor's note: as you've probably gathered, Ben is speaking in generalizations for effect. If you're reading this and thinking "not ALL improvement people…" you are correct, but we think the generalization is useful in this instance.

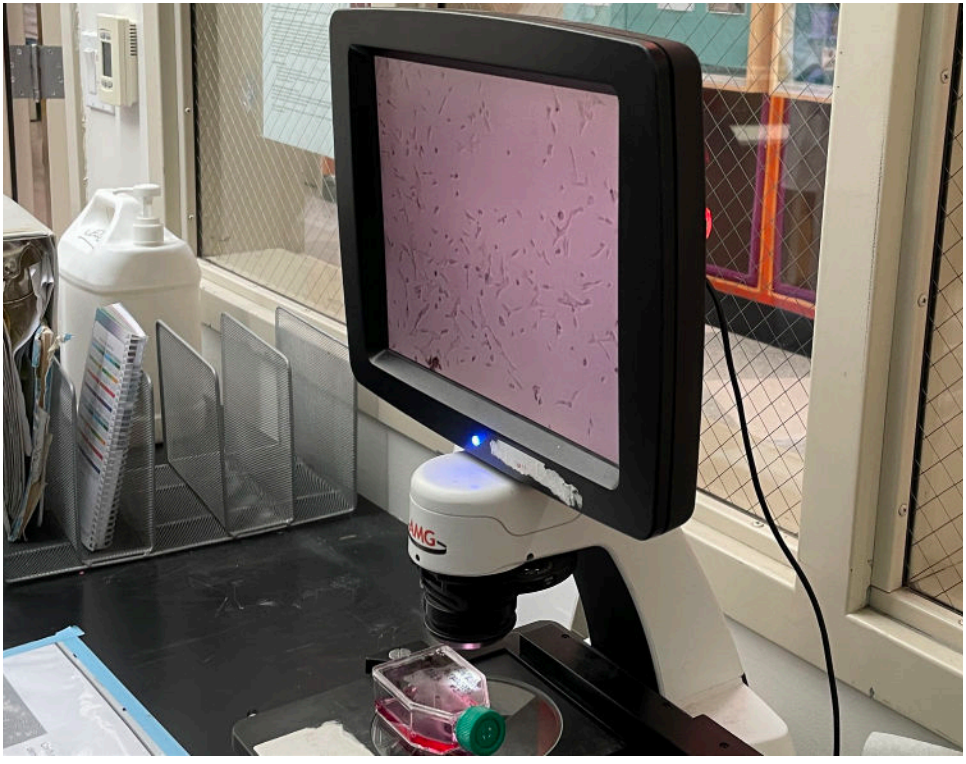
Above: High Tech High Mesa students collect field data at the Tijuana River National Estuarine Research Reserve.

Project Cards

Teachers and Students
High Tech High Schools
and other Innovative Schools

Project Cards provide quick glimpses of inspiring projects designed by teachers and realized in collaboration with students.

Our full collection of Project Cards is available to download for free on our website, ***hthunboxed.org***



Cures for Cancer Project
Jesse Wade Robinson
Eleventh Grade Biology
High Tech High

In this 11th-grade biology class, students worked in small groups to design experiments testing different drugs or therapies on live mouse cancer cells. The essential question asked something people ask every day: "How can we cure cancer?"

Students began this project by learning about cancer survivors who had beaten the odds. They wondered how different patients with the same type of cancer could have very different outcomes. Then the class assembled into small groups to research what causes cancer and its potential treatments. The students used what they learned from the scientific literature to design experiments testing how different treatments affected cancer cell growth and migration. Students presented their initial experiment designs to scientists that gave them feedback on their plans. After revising their procedures, students ran their experiments in the lab and observed the effect of the treatment on cancer cell growth under the microscope. They measured the impact of the therapy using photographs of cells and imaging software. Students analyzed their data using graphs and statistics and summarized their learning in a formal scientific paper and professional presentation to cellular biologists.

Teacher Reflection

The students were very motivated by the prospect of working with live mouse cancer cells. The authentic problem and materials increased the level of student engagement and rigor. The presentations to scientists at the end of the project, allowed students to share their deep levels of understanding and grapple with new and exciting scientific questions. Because students presented their work to experts in the field, the level of discourse was elevated.

—Jesse Wade Robinson

Student Reflections

Going into the project, I felt a little nervous because I didn't know much about testing cells. Thankfully, with the way the project was broken up, it made the project less intimidating and more doable. With first seeing examples of past projects and knowing that all the other groups did well, I felt more knowledgable. Now after working on the project, I know how to plan scientific experiments, lab sterile techniques, and using the microscope. Asking questions has definitely been helpful in learning. I used to think science experiments, especially ones that had professional equipment were out of reach with my skill set. Now I think that with guidance and support, anyone can do a science experiment.

—Madison B.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Breaking Free
Freddie Bermudez
Eighth Grade Humanities
High Tech Middle Mesa

Students learned about different kinds of addictions and the effects they have on individuals. They gained an understanding on the struggles behind addiction; learning that addicts cannot be forced out of addiction, rather they can only try to understand them. In order to showcase their understanding, students created a billboard that showcased the dangers of Fentanyl and put it up in Barrio Logan; they wanted to make an impact in their community. Students also filmed a mini documentary where they interviewed three different people—an addict, a loved one of an addict, and a professional. Through the interview process, students gained a first-hand perspective on the tragic reality of addiction.

Teacher Reflection

As a teacher and someone who was affected by having a mother with an alcohol addiction, I found myself learning and growing with the students. It was beautiful to witness their socratic seminars and how important different perspectives are. I also believe it is very important that students lead the conversations so that a variety of voices are heard. It is crucial that community members and professionals joined this project. Alateen, the DEA, TURN Organization, Judge Tim Nader, and others were key components in our learning as a class.

—Freddie Bermudez

Student Reflections

Hearing that addiction was the main part of the project was mind blowing because addiction is an issue which is rarely discussed in schools. We discussed these addictions through socractic seminars as well as research papers that helped increase our level of understanding on the topics. Not only were these discussions helpful for the project, we also understood more about each other's opinions and experiences. We knew we had to spread the awarness about addictions so we planned to design a billboard. With the money raised in a walk-a-thon, we were able to get our billboard displayed in Barrio Logan for two months. Overall this project has made a huge mark on all of us. It was so moving, meaningful, and developing.

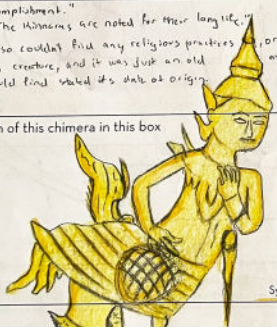
—Angel S.

PART 2: RESEARCH

Directions: Continue your research on chimera's by completing this page with research on two more mythical animals of your choice.

	Research
Chimera name: Kinnara	Description: "The Kinnara is a creature from Hindu and Buddhist mythology." They are part human and part bird, associated with music and love. It is "believed to come from the Himalayas, they often watch over the well-being of humans in times of trouble or danger."
Origin Myth: "androgynus beauty and of a lover's devotion, eternal beauty and one's undying devotion towards a lover."	
geographic origin: "Southeast Asian Buddhist Mythology"; countries such as Myanmar, Cambodia, India, Indonesia, and the Philippines recognize this creature.	
(According to Indian literature) Civilization facts: "In the Mahabharata, Kinnara kingdom is referred to the territory of a tribe called Kinnaras."	
"The Kinnaras, along with other exotic tribes, were inhabitants of the Himalaya mountains." "... living at mount Mandara."	
special powers: I couldn't really find any, it is just like a god that protects and watches over the people. Because of this, I couldn't find any weaknesses either.	
symbolism: "traditional symbol of feminine beauty, grace, and accomplishment."	
- "The Kinnaras are noted for their long life."	
I also couldn't find any religious practices, or associated rituals of this creature, and it was just an old mythology, nothing that I could find stated it's date of origin.	

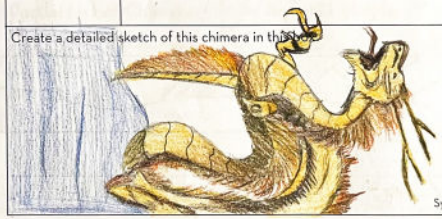
ed sketch of this chimera in this box



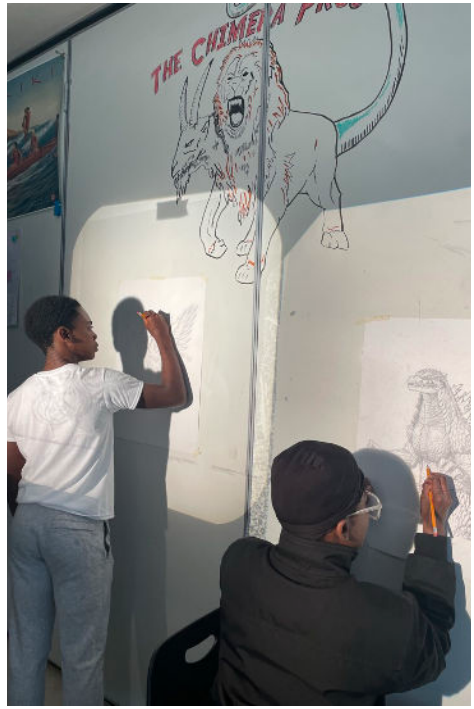
Symbol for this Chimera =

Research Topics	Research
☑ Name and Description	Chimera name: Shenlong. Description: It "is a spiritual dragon mythology who is the master of
☑ Symbolism	also a bringer of rain." Its appearance is very similar
☑ Geographic Origin	Chinese dragons such as long, niun, etc.
☐ Civilization Facts	Symbolism: the Chinese translation is literally: "god
☑ Dates of Origin	Geographic origin: spiritual dragon from Chinese myth
☑ Religious Practices	special powers: "governs the wind, clouds, and rain."
☑ Associated Rituals	Origin myths: "Agriculture depends on the and when ice cause storms and heavy rain."
☑ Special Powers	Additionals: -The Shenlong dragon is featured in the video
☑ Weaknesses	Ball.
☑ Origin Myth	- In videogames, the Shenlong was renamed in the English
☑ Additional Details	versions as "Shenron".
	Date of origin: unknown, but I assume also around th
	or emperors.
	As for religious practices and associated rituals, I co
	as most of the sites I come across were blocked or
	The Shenlong is of equal significance to other creatu
	Tianlong, the celestial dragon."
	I couldn't find any other
	additionals.

Create a detailed sketch of this chimera in this



Symbol f



The Chimera Project

Isaac Stanford
Seventh Grade Social Studies
Cedarbrook Middle School

The project used animal hybrids from cultures all over the world as a lens for students to study culture and mythology. Students had hundreds of chimeras or animal hybrids to choose from as these creatures appear in all parts of the world across human history, from the terrifying chimera of Greek mythology to the alibrejas featured in the Pixar film, Coco. All over the world and throughout history, cultures have created these animal hybrids and bestowed them with amazing powers. In part one, students were introduced to the Greek myth of Chimera and Pegasus. We read an adaptation of the ancient Greek myth and studied its origin and symbolism. We studied the different forms the Greek chimera had taken in artwork and storytelling through history. We watched excerpts from different movies and current television that have used chimera in their storytelling from dragons to gargoyles and mermaids. Chimera appear in hundreds of TV shows, movies, and video games, and we had fun looking for examples. In part two, the research began and students selected four animal hybrids they were interested in and began researching. We examined folklore, myth, symbolism, and cultural traditions all through the lens of these chimera. The project culminated as students reflected on their own culture, personality traits, strengths and weaknesses, and the animals that could be used to symbolize them.

Teacher Reflection

During this project, I learned that 7th graders love mythological creatures and the animal hybrids were an easy and accessible point of entry for almost all students. The 3D print option was difficult to get everyone across the finish line but was a good incentive to keep kids working. It would be helpful to have more than one 3D printer running due to the amount of time it takes to print. We learned about the folklore and myth of cultures all over the world. Hopefully this project will continue to engage students as we work to improve it for next year.

—Isaac Stanford

Student Reflections

I liked that I could make my own Chimera and origin myth. I liked that I could design something based on who I am.

—Ariana H.

Sharing Seeds

Sharing Seeds

Katelyn Livingstone, Math/Science
Crystal Poole Math/Science
Shane Duenow, Makers
Seventh Grade
High Tech Middle Media Arts

In this scientific & cultural study of San Diego native plants, students explored biodiversity and plant adaptations in San Diego, examined the importance of plants through past and present, connected with nature, and made a meaningful product that lives in their neighborhood. Students learned in nature, became citizen scientists, and reflected on their personal relationships with nature. They worked in groups to design plant books ("Planthologies") and then created books individually. The books were made with plantable seed paper and were donated to each student's neighborhood Little Library so that our communities could learn from them.

Teacher Reflections

Some of the best parts of this project came from the excursions and getting to be outside to learn. Not only were the field trips and field work rich and engaging for students, they provided opportunities for culture building that were different from those we experienced in the classroom. It was wonderful to see new students become curious about their world and share new ideas with me and their classmates. The handmade qualities of the books are charming and detailed; when you pick up the book and look through it, you can tell students have dedicated a lot of hard work. Another part of the project that was special was the highlighting of each student's unique neighborhood where the book would live. There are also many parts of the project I would like to explore deeper.

—Katelyn Livingstone

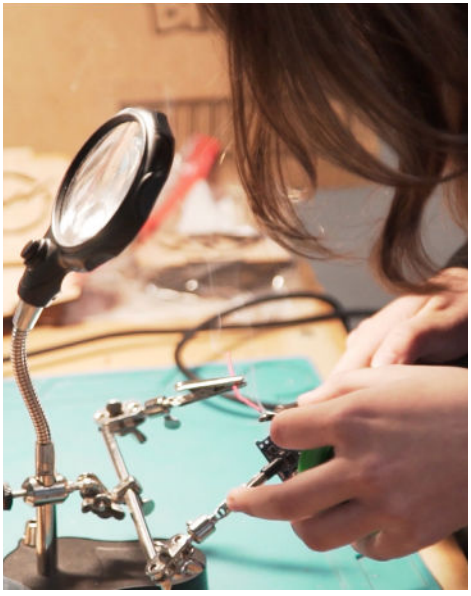
What I learned from this project is that students really want to design for something greater than themselves. There were a lot of a-ha moments that grew students' empathy and understanding of the greater world around them when we went on field trips to study native plants. I think it was in those moments that students saw they could be of service to others. In the next iteration of this project it would be helpful to develop a relationship with an outside organization that would be recurring. Something where students can see the change they are affecting with a community partner.

—Shane Duenow

Student Reflection

In this project we mostly had to communicate with each other. This skill is not something I am good with, if it is talking to my team or the teacher. I think I got better this year communicating because of this project. We had to work with another person and split the work equally so it helped me constantly pradtice communicating with others.

—Ariana H.




NEVER
STOP
READING

Light on Literacy
Ted Cuevas
Physics
Ninth Grade
High Tech High Chula Vista

Students created custom solar charging reading lanterns for a little buddy, kinder and 1st grade, at the Monarch school in downtown San Diego. The Monarch school has specific supports for the home insecure and their children. My team of students, the "Co-Op", meets several times throughout the project at their school. The emphasis is on Reading Literacy so the little buddies are read to on each visit, as well as, empathy interviews, submission of artwork the little buddy wishes, and refinement of final designs. Students learn about Circuit Electricity, 3D modeling for laser cutting custom designs, and soldering to create the solar charging circuit for the lantern. Co-Op students earn learning "Badges", for example, Soldering, Ohm's Law, Electric Circuits, 3D Modeling, Negative and Positive space, Mindfulness, and others. "Badges" are specific skills, knowledge, processes, and social emotional learning goals that are a "must" in providing evidence for a digital portfolio for Student Led Conferences, Presentations of Learning, and for sharing with education visitors from around the world. In addition, students learn about anxiety and depression, as well as, strategies for empowering healthy brain health. In researching solutions for home insecurity, students learn about the emotional stress on children and the importance of having a mindful mentor interact with them. The relationships forged are truly life changing.

Teacher Reflection

This is an incredibly motivating project and extremely engaging for the Co-Op students. I have learned over time that visiting several times is an incredible experience for developing relationships that are very meaningful for both the little buddy and the Co-Op students. In addition, over time, I have been able to add "challenge options," such as, an integrated rechargeable sound module where students record themselves reading their favorite children's book. Several were recorded in Spanish, the first language of many of the little buddies. The next change would be to reintroduce the option to design a Reading Lantern that can be 3D printed. Since Covid, I have emphasized laser cutting, for ease, however, the option to 3D print offers an endless customization of the form the lantern can be made. This is a fantastic project with many different ways to implement, for a first time project based learning educator, to a veteran.

—Ted Cuevas

Student Reflection

The Light on Literacy project originated as an idea where some ninth grade kids could build something out of learning circuit skills, sketching, designing and most importantly compassion. We were able to make a solar charging Reading Lantern for a child challenged with home insecurity. We took time to get to know them in order to personalize it and give the best that we could.

—Daniela T.

Hero vs Villian

Hero vs Villian
Jorge Cerna, Humanities
Dan Allen, Art
Eleventh Grade
High Tech High Media Arts

This project focused around the idea of duality in society. Our theme was centered around how an action, idea, or individual can be perceived as a "hero or villain" based on perception. The class investigated this topic through a historical, literature, civics, and modern day lens. Students also did work in their Art class to be able to show and create various images/ ideas through different perspectives. The main goal was to ask students to critically think how society can label or define something as heroic or villainous but often times it really depended on your perspective (bias, background, moral/ethical code, etc) that made you lean one way or the other. Students were asked to write informative writings on canva depicting the heroic and villainous perspective of their groups topic. These writings had to match tile pieces that told the same message and could be connected be their symbolic representation of the event, person, topic, etc that their group picked. The project culminated with the work curated as a living representation of perspective and duality in around our water fountain the school.

Teacher Reflection

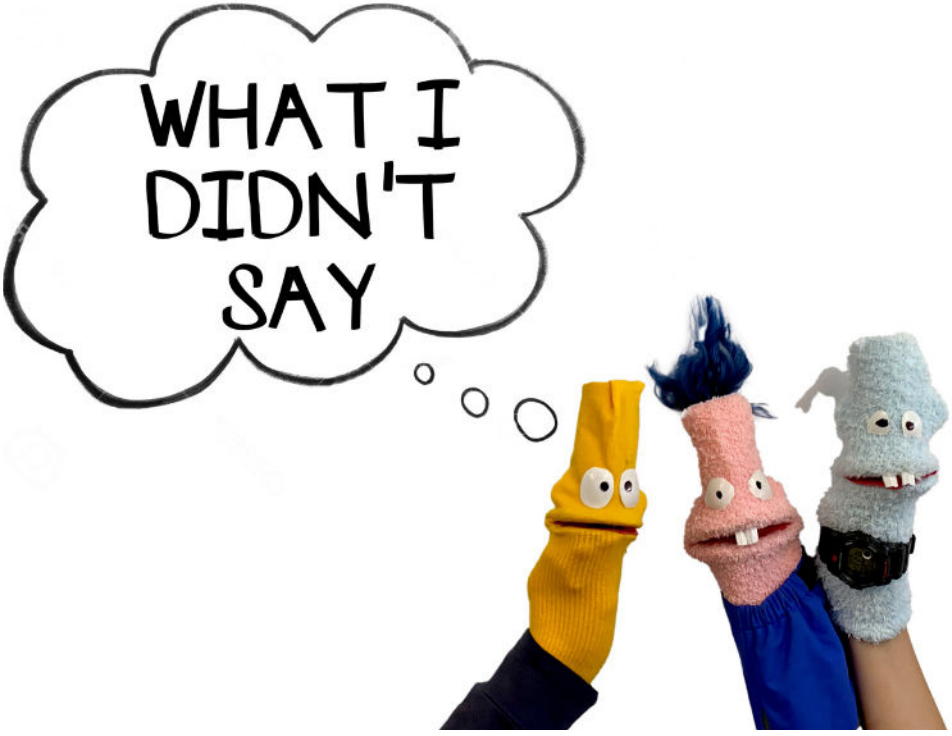
It is extremely valuable and important for students to be able to display their work. When students know and understand that what they create will be a "living" model for future students to see there is a lot of ownership and motivation in that. It can be challenging to figure out how to display student work (especially writing) but if it can be thoughtful and serve a purpose (i.e. improve school community) then it will have more meaning for students. Biggest challenge that I had in this project was time (or lack thereof) and trying to get through content without falling behind. Our final product ideation phase felt a bit rushed and I didn't connect the dots for the students enough for them to understand what was the purpose of what we were learning. The novel we read also didn't have a big impact on the project and it felt like it didn't serve any purpose for them understanding our project goals.

—Jorge Cerna

Student Reflection

Overall through all the challenges our group was able to get everything done in time. Our project came out really good. Im proud of my group for pushing through all the challenges. Our tiles, writing pieces, and website turned out really good.

—Daira L.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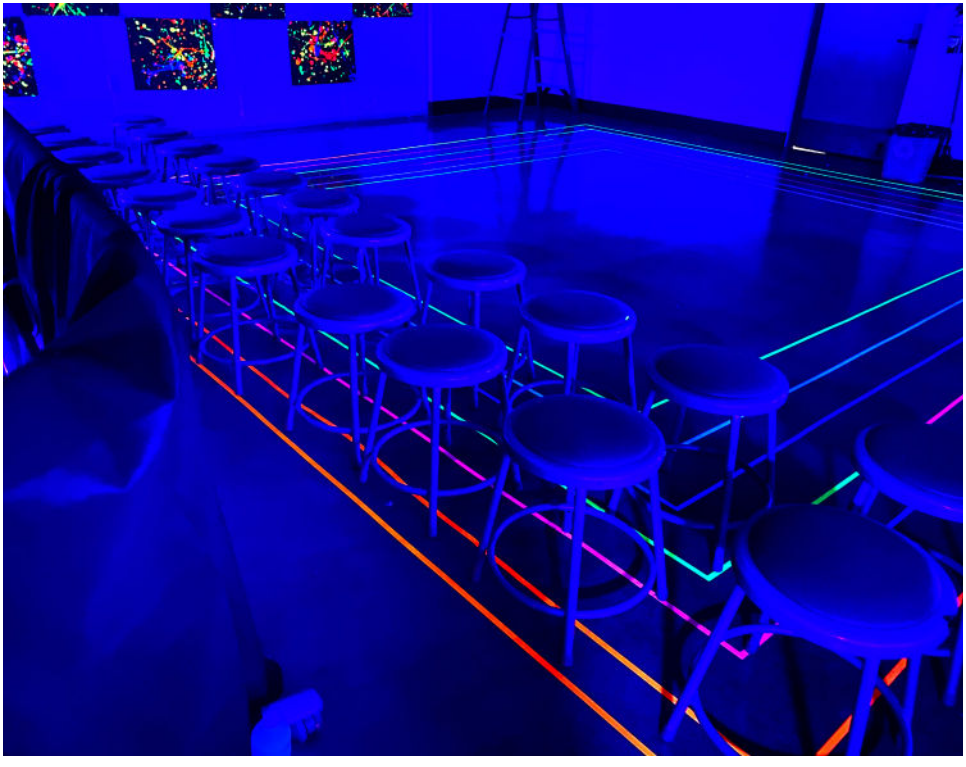


What I Didn't Say Puppet Project
Fernando Vega
Performing Arts
Seventh Grade
High Tech Middle Mesa

This blacklight neon puppet show went far beyond what one might expect, because the core theme of the project revolved around a profound question: "Is there a moment in your life when you wished you had spoken up?" This question gave birth to truly impactful and transformative stories.

Students shared experiences of being insulted in hurtful ways, such as one being called an ape, another being labeled as a "dog eater," and yet another being told to "go back where they came from." To illustrate my own story, I created a puppet based on an incident at a Padres game. In this tale, my father boldly confronted a man who was riling up a crowd by making derogatory comments about a stalled car, using offensive language like, "It probably belongs to a [derogatory term for Mexican]."

The project began on an equitable and engaging note, and the students quickly grasped its significance. Their stories were set against the backdrop of a lunch table, with conversations initially revolving around small talk. However, it all led up to a pivotal blacklight moment, what we referred to as the "bottom of the iceberg" or subtext. When the characters finally advocated for themselves, a dramatic glass-shattering noise filled the room, and blacklights illuminated the neon-painted puppets and the entire space. The transformation engaged both the visual and auditory senses.

Teacher Reflection

The transformative testimonials were jaw dropping. The sizzle was sensational. The "building" aspect of this project was easy to manage. The students were productive and engaged while they made their puppets. The launch was what I feel set the tone. It laid down the minimum expectation. It showed the students what the end goal was.

—Fernando Vega

Student Reflection

The stories from the project they really had a lot about people's lives as some of the stories are about racism. Making the puppets was fun because you just got to make it in your own image however, you wanted. Exhibition looked like like a very scary room and the walls lit up in neon

—Anthony G


HABIA
UNA VEZ...

Habia Una Vez

Vanessa Medellin, Math
Mathew Chapman, Science
Tracy French, Art
Sixth Grade
High Tech Middle North County

In this project, students immersed themselves in the diverse landscape of indigenous cultures, blending arts, science, humanities, and math. The essential question asked "How can impactful stories lead to long-lasting shifts in our attitudes and behaviors?" Students explored the impacts of colonization on communities, and expanded their understanding through meaningful conversations. From absorbing the wisdom of indigenous communities like Rincon Reservation to crafting constellations inspired by the storytelling traditions of the sky, students embarked on a holistic learning journey. The project's centerpiece, *The Last Cuentista* by Donna Barba Higuera, guided them through Petra Peña's poignant narrative, emphasizing the importance of preserving cultural histories. This initiative aimed to celebrate diverse thinking, create a platform for dialogue, and inspire a future that values a spectrum of perspectives, weaving together the threads of shared humanity and celestial storytelling.

Teacher Reflection

The meaningful connections forged between science, humanities, math, and art not only enriched the student's understanding but also facilitated constant reflection, questioning, and dialogue. Witnessing the students actively engage with indigenous communities, creating a sense of community within our classroom and families, and delving into historical narratives has been profoundly rewarding. This experience reinforces the importance of diverse representation in the classroom and the profound value of connecting with one's cultural roots through the exploration of origin stories. It is a testament to the power of fostering engaged, curious, and culturally aware learners.

—Matt & Vanessa

Student Reflection

Some things that I liked about this project were making a stamp. I enjoyed making a stamp because it was a fun experience to create. My stamp is about a man reaching for a star. My favorite thing was reading The Last Cuentista. This book is about a 12-year-old girl called Petra Peña. She was moving to a new planet called Sagan.

—Maya

What I enjoyed most about this project was when we started making our constellation drawings because of how we got to use our stars to have a connection to our constellation stories. I felt that this project was very fun to do because we learned about how people used to live and how unfair people were back then during slavery and colonization as well as how they were treated because of how they looked or their race and for being a part of an indigenous community.

—Emily

Beach Hoppers
Matt Leader, Biology
Ashleigh Lin Humanities
Eleventh Grade
High Tech High North County

The San Diego Coastline is one of the most sensitive and unique habitats in the world with a higher percentage of endangered organisms per zip code than anywhere in the continental United States. Our task is to better understand the people, places, organisms and issues surrounding the existing natural spaces along the coast in San Diego. In the beach hoppers project students observe environmental interactions, identify organisms, interview people and analyze data from field work along the beach and beach communities in San Diego they visited through free public transit. With research occurring in biology and english and supported by the San Dieguito River Park, Palomar College and the San Diego Botanical Garden, students developed media in video, pictures and podcasts detailing the experiences and investigations. Student products are produced for all audiences but have been asked to connect to their 3rd grade partners at High Tech elementary North County for their similarly themed Nature Treasures project. The a goal of the project was to get the students actively investigating in communities they hadn't visited prior and share that through mentorship with younger students.

Teacher Reflection

I learned it is so valuable to connect students to communities outside school and their neighborhoods. They saw many different perspectives through interviews each day. I also learned isn't too difficult to take project research and investigation out of the class by making use of public transit and scaffolding that puts students in charge of the field work planning.

—Matt Leader

Student Reflection

Through this project we get a general grasp of all living things in San Diego County. I like how it is our responsibility to keep our organism alive and research independently. During our fieldwork we interview people we come across and look at their diversity. I think the field work is truly allowing us to see more people outside of school and the diversity of people in our area. I met a guy that toured in a band. He was really genuine and sweet. He taught me to use our time doing something we love.

—Karly C.

Above: Kurt Wootton facilitating a workshop for teachers.

The Performance Cycle: Building Community

Kurt Wootton
Habla Institute

Eileen Landay
Brown University

It is our great pleasure to share this edited excerpt from Engage: Creative Strategies for Teaching and Learning, *by Kurt Wootton and Eileen Landay.*

As anyone who's ever attended a workshop with Kurt or Eileen knows, they make magic happen in those sessions. Engage is their spell-book: full to the brim with techniques for facilitating creative, full-body learning for kids and adults alike. The book is organized around "The Performance Cycle," so this excerpt begins with an explanation of that. After that, you'll find an edited version of Chapter 1: Building Community. We chose to share this chapter because although it's written with teachers in mind, the ideas here are useful for any gathering of humans, from a preschool class to a staff meeting.

Note: for the sake of brevity, this excerpt includes fewer than half of the "building community activities" that appear in the book. If you want to see all of them, we suggest ordering the book!

The Performance Cycle

Eileen began some of the experiments that would lead to "the performance cycle" as a classroom teacher in Maine where her students created and performed readers' theater, wrote and bound novels, made movies, illustrated and displayed poetry. In his English classes,

Kurt applied his skills as an actor and theater director and saw even the most reluctant students become increasingly engaged. He noted, for example, that in preparing a theater production of *Alice in Wonderland*, his cast paid careful attention to Alice's development as a character in her journey through Wonderland. Both of us found that in using these specific strategies and activities, students became far more interested, alive, engaged.

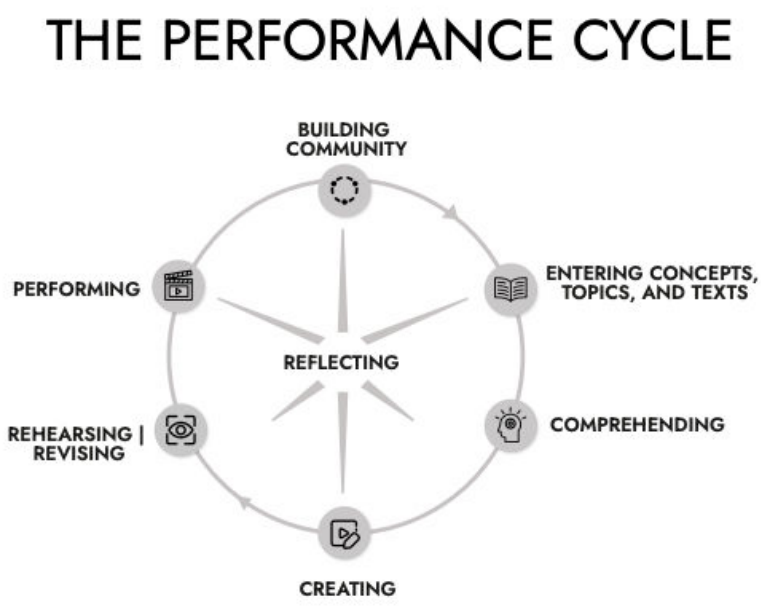
Beginning in the early years of our collaboration, we brought together artists and performers and partnered them with literacy-focused classroom teachers from a variety of disciplines. We designed and tried multiple activities in partnership with both elementary and secondary school students. Together, artists, teachers, and students explored a range of approaches and methods to demonstrate their knowledge. Would they create a modern dance? Would they write their own stories thematically related to the text and perform them? Would they create a short film to interpret a text in their own unique way? Teachers and students had creative autonomy to design both the *process* and the *product*.

Along the way, we noted that inevitably, the most successful pattern involved *students using one or more art forms to perform their understanding of what they are learning*.

In documenting this work, we noted that the most effective groups began with a warm-up activity that created immediate interaction and took important first steps in becoming an ensemble. We called this **BUILDING COMMUNITY**. Invariably, the second component of the process focused on establishing the topic, identifying questions, and creating a purpose for learning. In this step, teachers and students made personal connections between the material and their lives. We called this **ENTERING CONCEPTS, TOPICS, AND TEXTS**. Next, class members dove deeply into the material, absorbing, researching, and interpreting as a means of **COMPREHENDING** the topic and text. In the next step, students began **CREATING**, constructing an original response to questions they'd earlier agreed to pursue. In **REVISING/REHEARSING**, they shared, shaped, and refined their response, preparing it for a public **PERFORMANCE OF UNDERSTANDING**. Every step of the way, but especially at its completion, they **REFLECT** on multiple aspects of their work. Over time, the process developed into a clear and flexible framework for guiding instruction and learning that we named **THE PERFORMANCE CYCLE**. To describe the components of the cycle, we created this graphic (see Figure 1).

In our discussions, we came to understand that when a group plans to *perform their understanding* of their learning, they are working towards a clear and specific purpose. They know they must accomplish a task within a given time frame. They know they are preparing to share their understanding and insights with an audience—whether with fellow students or with the

Figure 1: The Performance Cycle



community outside of the classroom. Performance, unlike much of schooling, is collaborative. Rather than taking a test, writing a paper, or filling out a worksheet, students work with one another. They engage in bringing something new to the world.

Building Community

> Beloved community is formed not by the eradication of difference but by its affirmation, by each of us claiming the identities and cultural legacies that shape who we are and how we live in the world.
> —bell hooks, *Killing Rage: Ending Racism*

Imagine for a moment that you are a student in a class you teach. Do your best to *become* that student as you cross the threshold into your classroom. It is early morning. Behind you are the ebb and flow of the school's hallway. Within you are the experiences and effects of this morning and the days preceding it. Before you is a familiar doorway. And on the other side of the door, a well-known space, enclosed, relatively quiet, and predictable. Hesitate for a moment before entering. Take a breath. How do you feel? What are you thinking about? What do you imagine will welcome you on the other side?

Above: Kurt Wooten leads the Performance Cycle activities with educators.

- Is this a place where you will be recognized and appreciated with a smile and a greeting?
- Does what goes on in this place interest you? Does it matter?
- Is it a place where your voice will be heard and your skills acknowledged?
- Will you be called upon to engage and participate in ways you find interesting and manageable?
- Will you be encouraged and helped to make connections between what you already know and new information you will receive, where your horizons are widened, your curiosity is piqued?
- Will you be encouraged and supported in trying new ideas and skills, practicing and strengthening those skills, taking appropriate risks, and making an ongoing effort to learn and grow?
- Is this a place where you recognize others in positive ways, learn to see their strengths and establish and maintain connections that help you all to create, build, and grow?
- Can you count on being supported in ways that will help you address your challenges?
- Is this a place you trust?

A place that fulfills these criteria is a *learning community*. In ways large and small, its activities and relationships are designed to help set a learner's feet on a path toward a positive social future. Crossing the doorstep into an effective learning community, you will find people with a shared purpose and diverse experience and skills in an environment where everyone's contributions are valued and supported. The community's primary goal is to advance its collective knowledge and skills and to make explicit not only what everyone is learning but how learning is being accomplished. Together, you and others create and share learning among yourselves. Later, you will extend that learning by participating in a *performance of understanding* in a more public setting (Perkins and Blythe, 1994). And finally, you will be called upon to reflect on what you've done and what you've learned.

Now, step back and imagine yourself not as a student crossing the doorstep into a physical or virtual classroom but in the role that you, a reader of this book, is most likely to fill: as a teacher responsible for establishing and helping to manage such a learning community. You too cross that doorstep every day. You too are a member of this learning community, though your role differs, especially at the outset when you will be responsible for introducing **THE PERFORMANCE CYCLE** model, establishing the climate and setting the work of the community in motion. What will you need to say and do as you help to create such a community?

Building Community: The Launch Pad

THE PERFORMANCE CYCLE is a way of building a *learning community* or *community of practice*. Lave and Wenger define communities of practice as "groups of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly" (1999). Members of a successful learning community share a willingness, ability, and understanding of common purposes and goals. They also share a menu of options that will accomplish what they are setting out to do. While members' goals and purposes may be shared, their individual backgrounds, talents, skills are likely to differ widely. A strong learning community, then, has space for many kinds of talents and people who are both novices and experts in particular areas. To prepare community members to live and work together, each person's contributions must be respected, and the community must develop some methods for sharing and synthesizing diverse views.

Activities welcome and engage community members, build trust, erase boundaries, and help everyone to contribute productively. Members are encouraged to be present, awake, aware, and motivated. Both minds and bodies are engaged. Activities offer a combination of safety and challenge that helps students grow toward full participation as learners and critical thinkers. Creating this environment is a crucial step and one that you'll need to revisit again and again; the students may initially be reticent; they may be more comfortable being silent, passive, and invisible, accustomed to working alone rather than as part of a collaborative community.

Community building activities support students as they collectively address a question, revise, refine, and present together, reflect, and ultimately learn and grow (Berger et al., 2016). They come to feel they are in a safe space (Educators 4SC, n.d.). They develop relationships and share responsibilities. Community members take an interest in what others think and do and provide the support they need for everyone to make choices and take risks.

By working in classrooms over the years, we have learned that some of the activities that follow may seem daunting for teachers as well as students. How do you maintain classroom decorum and control when students are out of their seats and moving around? How do you engage students in art forms or mediums you've never been trained to teach? How do you arrange physical spaces that will accommodate new activities you want to try? If students are online, how do you engage them in hands-on experiences that keep them focused and connect them to one another? The foundation of a supportive, vibrant classroom community needs to be renewed again and again. All of these require preplanning and persistence, but all are manageable. Begin first with the activities that seem easiest for you and modify as needed. For

instance, you can lead an activity like **COMMON GROUND** with students remaining in their seats. Instead of walking across a line, students can raise their hands when their answers are "yes." Similarly, with any activity that pairs students to talk with one another, simply ask them to put two desks together and "turn and talk." By using the activities that follow, you will learn to create a context that supports everyone's safety, comfort, and ultimately, readiness and willingness to learn. Activities in this initial stage include:

- **CONNECTING WITH OTHERS**
- **ENGAGING BODY AND MIND**
- **FOCUSING ATTENTION**
- **ESTABLISHING IDENTITY**

Building Community Activities

This section presents a variety of partner activities for introducing students to one another and to strengthen the classroom community. Before beginning this work—or shortly thereafter—explain the purposes for the activities, letting students know that, at times, they will be partnered with friends and at other times with others less well known. Depending on the circumstances, you may just want to plunge into the activity. Or you may want to begin by acknowledging that what you're asking them to do may seem unfamiliar and ask for their cooperation. Everyone in the class is part of the classroom community and everyone's job is to "take care of one another." These activities prepare students to create and participate in a community of *receptive minds*, confident, willing, curious, and open to new challenges (Mandell and Wolf, 2003).

Connecting With Others

CIRCLE CROSS

This activity introduces students to the practice of moving on request, following directions, and creating partnerships. Students stand in a circle. By the count of 10, they cross the circle and find a new place to stand. Remind them to cross silently, without touching each other, and without bunching up in the center of the room. Begin counting 1 . . . 2 . . . 3 . . . and by 10, ask the students, "Did we succeed?" If not, try several times until the class is successful. Then when students have found a new place to stand, ask them to lock arms with the person next to them, who then becomes their partner. (With an odd number of students, ask one pair to welcome a third person into their group.) Repeat this activity when needed as a quick way of focusing the group's energy, creating order, and establishing new partnerships.

STAND UP—HAND UP—PAIR UP

When students have been working with partners and it's time for them to change partners, ask everyone to stand and put their right hand in the air.

They leave the space they've been occupying, walk to a different space, find a person they haven't worked with before, and give them a high five. This person becomes their new partner.

HUMAN ATOM

Students move around in a large, open space—on a stage or in a classroom with the chairs and desks cleared. Each person walks to the center, then to the edge of the space, and then back to the center. They continue this movement—to the center, then to the edge—repeatedly, while you coach them with various instructions. Ask them to walk silently, focusing their thoughts internally, without giving one another eye contact or touching. When the "atom" is well established, ask them to freeze in place and high-five the person next to them, who becomes their partner for one of the following activities. When the activity is completed, return to **THE HUMAN ATOM** again to mix up the room and find a new partner.

Engaging Body and Mind

THREE-PART HANDSHAKE

With a partner, students create a three-part, full-body handshake. They might for instance, give a high five, both spin around in a circle, then click their heels together. You and a partner model the activity, encouraging broad gestures. After creating and practicing their handshake, each member of the pair finds a new partner and teaches their handshake to the other. If time allows, several pairs can perform their handshake for the entire group.

BALLOON TOSS A—Z

Students are in pairs, each with an inflated balloon. They take turns batting their balloon back and forth with each person saying the next consecutive alphabet letter. One partner cannot hit the balloon twice in a row. Continue back and forth until the pair reaches the letter Z. The goal is for partners to succeed at reaching Z, not to trick one another.

BACKWARD ALPHABET

In this challenging partner activity, students recite the alphabet backwards from Z to A, each taking a turn. First person says, "Z." Partner says "Y" and so on until they reach A. When they finish, they simultaneously throw their hands up in the air and say "alphabet" or some other phrase chosen in advance. If appropriate, introduce an element of competition. First pair who gets to A is the winner.

Focusing Attention

ENERGY PASS

This activity is an excellent way to focus the group's attention in a morning

meeting or at the beginning of a class. Students work as a group to pass energy around the circle in the form of a clap. Student A swivels to the person on the left and the two clap simultaneously. Person B then swivels to the left and simultaneously claps with Person C, thus passing the clap again to the left. The next student repeats so that the clap is passed all the way around the circle. Early efforts are unlikely to be a series of smooth, fluid gestures, though that's the goal. Practice so that the "energy" passes seamlessly and quickly around the circle with each person making eye contact when clapping with the person next to them and passing it on.

VARIATIONS:

- As the class becomes more accomplished, begin a second clap moving in the same direction. Add a third clap, so that multiple claps are moving around the circle at the same time. Increase the speed.
- The students take one another's hands and close their eyes. The leader begins the activity by squeezing the hand of the person on their left. That person will then squeeze the hand on their left. Continue to move the pulse around the circle. Add additional pulses and directions to increase the activity's complexity.
- Pass the energy in the form of a gesture, a pose, or motion, or even a gesture/ sound combination. Person A creates a movement and sound and passes it around the circle. Then, after Person A's gesture has moved all around the circle the person to Person A's left creates the next sound and motion to pass around the circle.
- In a popular variation, each person says their name and makes a gesture. Everyone in the circle mirrors it.

THOUGHTS:

As with many **BUILDING COMMUNITY** activities, the first attempts may go poorly. There is a reason the activities are called "building" community. This is an active process that takes time and deliberate practice. Many of these activities were first developed for ensembles of performers to increase their capacity to work collaboratively and fluidly as a team.

MERIDA MOSQUITO

This activity is similar to **ENERGY PASS**. The name came from the act of swatting an imagined mosquito at the Habla Education Center in Merida, Mexico. Gather participants in a large circle. Person A will swivel left. Person B will duck. Then, Person A will make eye-contact with Person C and they will simultaneously clap over person B's back. Person B quickly returns to standing. Person C ducks down. Person B makes eye contact with Person D and they clap simultaneously over Person C's back. Continue around the circle. The initial rounds will be slow, and many people will make mistakes. Stop and reflect, asking "What does it take for us as a group to be successful?"

Resume the activity, aiming for a fluid movement around the circle.

BALLOON TOSS A—Z (WHOLE GROUP)

This is a variation of the partner **BALLOON TOSS**, using one balloon for the entire group. The class forms a circle. One person tosses the balloon up in the air. Another person hits the balloon in the air and says "A." Group members continue to hit the balloon in the air, calling out the next letter in the alphabet. If the ball touches the floor or ceiling, the activity starts again with "A." When the group reaches "Z," declare victory!

In larger spaces, it might help to have one student in the center to deflect the balloon when necessary. Before beginning, explain the design parameters of the activity.

- This activity is silent except for the letter spoken by the person hitting the balloon.
- The balloon cannot be hit by the same person twice in a row.
- Everyone shares leadership. People step in and out when appropriate.
- No dangerous moves. Keep the space and one another safe.

VARIATIONS:

Although we're calling this **BALLOON TOSS A—Z**, different types of balls might be substituted for the balloon to add difficulty. Once students master the activity with a balloon, a beach ball is a good second step. Some teachers have even used a rolled-up piece of paper. Be aware of ceiling height and lights.

THOUGHTS:

If the class is too out of control or you feel the space isn't safe, stop the activity and remind students of the design parameters, particularly the ones about sharing leadership (for those enthusiastic students that want to hit the ball every time) and about keeping the space safe for everyone in the classroom.

Establishing Identity

COMMON GROUND

This activity works best in a large, open space with no desks or tables. Indicate an imaginary (or real) line down the center of a room. The class gathers on one side of the line. Explain that one side is the no side, and the other side is the yes side. Ask a question they can answer with a yes or no. Depending on their response, they either stay where they are or cross the line. Design a series of questions that begins to introduce group members to one another and that all will be comfortable answering.

Questions might include:

- Do you have pets?
- Do you play a musical instrument?
- Do you consider yourself an artist? An athlete?
- Do you consider yourself "good" at technology?
- Do you like to read?
- Do you like to draw?
- Do you like to sing?
- Do you like to dance?
- Do you like to perform onstage—whatever "performance" means to you?
- Do you speak more than one language?

Questions may lead to further conversation. You might ask students to describe the instrument they play or identify the languages they speak.

This activity may introduce questions about curriculum content, topics, or themes. In a unit on the book *The Wild Robot*, we asked students, "Do you have a robot in your home?" In using this activity, we discovered that the students' definitions of robots varied. Some students considered the apps on their smartphone a robot and a debate ensued: precisely the point of the question!

Questions might be more factual. In a unit focused on the text *A Long Walk to Water*, a book that takes place in Sudan, we asked, "Do you know what continent the country Sudan is in?" and then the questions "Can you identify Sudan on a map?" and "Do you know Sudan's official languages?"

VARIATIONS:

- If a large open space isn't available,students might stand up at their seats, or even raise their hands if their answer is yes. We've used the stand-from-your- seats approach for auditoriums with hundreds of people.
- We asked people to call out the names of instruments they play, or languages they speak.
- For deeper questions we asked participants to turn in pairs or trios and have conversations with the people around them.
- Online, students can simply cover their camera for no and keep it uncovered for yes. Thumbs up and thumbs down works as well.

SONGS IN THE KEY OF LIFE

Donald King, co-founder of the diversity and equity organization Lift Every Voice, asks participants in his workshops to think of a song that is "reflective of who you are." It may be from "your childhood, your church, your kitchen, your street." After participants have time to remember a song, he asks them to then choose a phrase or line from that song, allowing time for participants

to quickly check lyrics online if need be. Each participant then shares their line or phrase, speaking or even singing it. Many times, this has resulted in the entire room singing a song together. Afterwards, in small groups, participants tell the story of their song.

CONTINUUM

Delineate a real or imaginary line running across a room with enough space for all students in the class to stand on. Responding to a series of prompts, students arrange themselves on a continuum based on where they locate their response. Illustrate with an easy example such as vanilla and chocolate ice cream. If a person stands on one end of the continuum, the chocolate side for instance, they are demonstrating that they love chocolate and don't care for vanilla at all. In the middle, they might signal they are a perfectly balanced vanilla and chocolate person. If a student doesn't like either chocolate or vanilla, they may find a neutral place to stand off the line. After giving a prompt that is particularly contentious, ask students to turn and talk with each other about why they are standing where they are or ask volunteers to share their reasoning with the larger class.

General continuum categories may include:

- Born near here/born far from here
- Speak one language/speak many languages
- Introvert/extrovert
- Dreamer/realist
- Coke/Pepsi
- Cake/pie
- E-reader/print book
- Streaming/vinyl
- Cat/dog
- Want things to change/stay the same
- Day/night person

Similar to **COMMON GROUND**, this activity may begin a conversation on themes, concepts, and questions relevant to the topic or text you are studying. In a unit on Shakespeare's Macbeth, for example, we introduced continuum that included:

- You believe/don't believe in the supernatural
- You are attracted by power or not
- You feel your life is governed by fate or individual choice

Following each of these, we engaged students in discussions in small groups and then as a whole class.

VARIATIONS:

A teacher at Habla in Mexico, Tommaso De Silvestri, has an elegant solution to facilitating this **CONTINUUM** activity online. He creates a small circle icon of every student's portrait (the size of a penny on the screen) and places them all on one slide of Google Slides. He then creates a horizontal line on the same slide creating a CONTINUUM. Sharing the link to the slide, students can manipulate their portraits by moving them up and down the continuum. Tommaso calls out the categories and students shift their icons for each set of categories.

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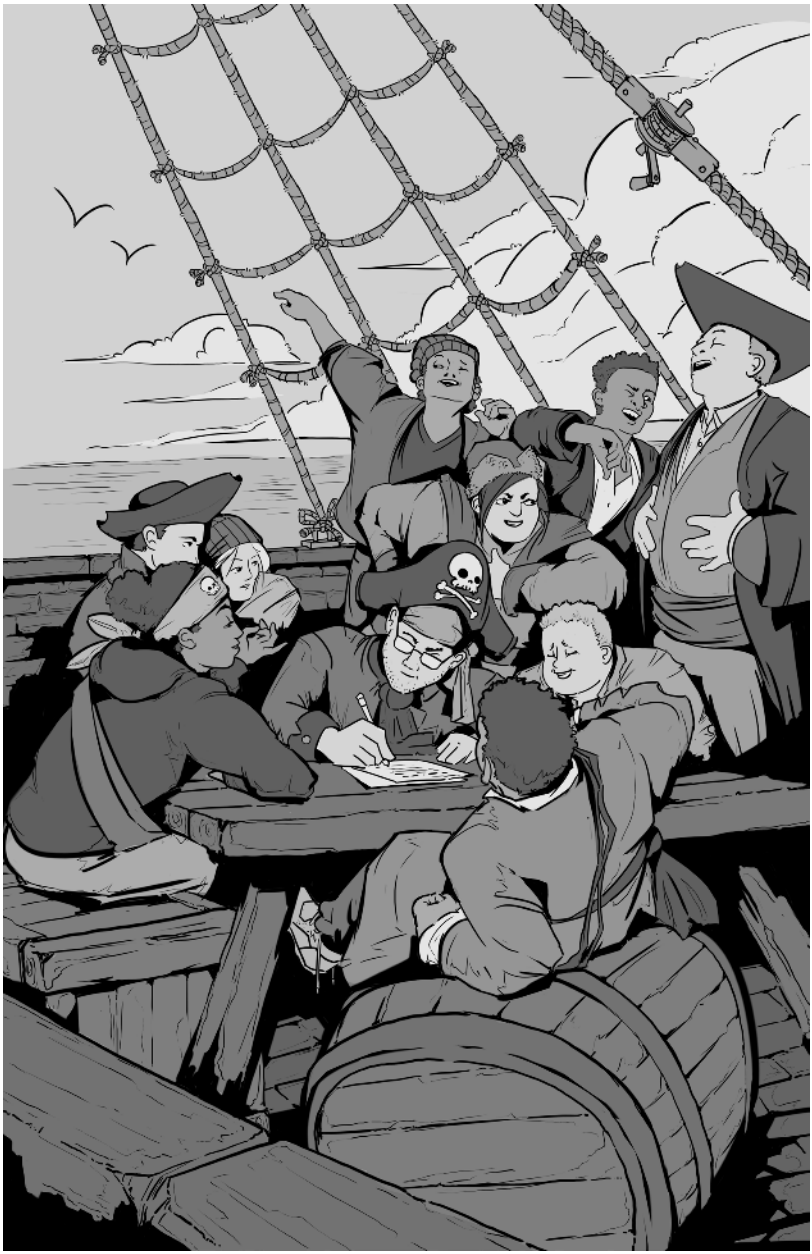

Above: Illustration by Dean May

Teach like a (Historically Accurate) Pirate

Alec Patton
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In 2012, San Diego teacher Dave Burgess wrote *Teach Like a Pirate*, a book that became a *New York Times* best-seller, and influential enough that if you work in schools, it's likely that you've at least heard the phrase "teach like a pirate," even if you aren't sure what it means. Here's how Burgess explains it:

> Teaching like a pirate has nothing to do with the dictionary definition and everything to do with the spirit. Pirates are daring, adventurous, and willing to set sail into uncharted waters with no guarantee of success. They reject the status quo and refuse to conform to any society that stifles creativity and independence. They are entrepreneurs who take risks and are willing to travel to the ends of the earth for that which they value. Although fiercely independent, they travel with and embrace a diverse crew (xii).

That all sounds good to me, but none of it is unique to pirates, nor is it meant to be. As Burgess says, it's "nothing to do with the dictionary definition."

But what if we take the "dictionary definition" seriously? What would it mean to teach like a historically-accurate pirate?

First, we need to get specific. People have been robbing each other at sea for

as long as people have been sailing, but when historians refer to the "golden age of piracy" they're talking about the period from 1650 to 1730, a period which peaked between 1710 and 1720. And the sailors who decided to turn pirate during that time were participating in one of the most ambitious experiments in radical democracy in the history of humanity.

Yes, you read that right. Teaching like a historically-accurate pirate means turning your classroom into an experiment in radical democracy.

We'll get into that in a minute, but first, let's address the elephant in the room.

Didn't Pirates Actually Do Bad Stuff For a Living?

When I first heard about Dave Burgess's book, I was a little put off by the "pirate" thing, because I thought of pirates as being stylish but basically immoral. Like, they made their living by robbing and killing people, right? I'm against that, no matter how daring you are.

Context, in this instance, is everything. The "golden age of piracy" took place as Britain, Spain, Portugal and France were sending ships out around the world to take riches by force from anybody they could overpower. They were also kidnapping thousands of people and forcing them into slavery.[1]

In other words, pirates were stealing from thieves, and while that doesn't make them any better than the governments of Britain, Spain, Portugal, or France, it doesn't make them any worse either.

What set the pirates apart was how they organized themselves on their ships.

It's hard to conceive of how awful it was to live on a ship as a sailor in the early 18th century. Samuel Johnson memorably declared in 1759 that "No man will be a sailor who has contrivance enough to get himself into a jail; for being in a ship is being in a jail, with the chance of being drowned" (Boswell). In his book *Villains of All Nations: Atlantic Pirates in the Golden Age* (which is the main source for this piece), University of Pittsburgh professor Marcus Rediker paints a vivid picture of life aboard an 18th century merchant ship:

> Sailors suffered cramped, claustrophobic quarters, "food" that was often as rotten as it was meager, and more. They experienced as a matter of course devastating disease, disabling accidents, shipwreck, and premature death. They faced discipline from their officers that was brutal at best and often murderous. And they got small return for their death-defying labors, for peace-time wages were low and fraud in payment was frequent (43).

Piracy wasn't just a rebellion against these conditions, it was a totally different way of organizing life on a ship. Not only that, it was a totally different way of living in the world: at a time characterized by xenophobia, racism, slavery, and theft, pirate ships were multinational and multiracial. In Rediker's words, a pirate ship's "core values were collectivism, anti-authoritarianism, and egalitarianism, all of which were summarized in the sentence frequently uttered by rebellious sailors: "They were one & all resolved to stand by one another" (26).

A Pirate's Life for Me (Sort of)

There were two ways to become an actual, golden age pirate: either you banded together with the rest of your crew to mutiny and wrest control of your ship from the captain (after which you made your own flag and hoisted it), or, if you were on a ship that got attacked by pirates, you volunteered to join them.[2]

Reading that last paragraph, you may have noticed a problem with the premise of both Burgess's book and this article: in order to have a classroom "like a pirate," your students would need to mutiny, banish you from the room, and organize themselves without a teacher. Teachers are, whatever else we tell ourselves, agents of the state, which is (to put it mildly) not very piratical. Meanwhile, because students are compelled by law to come to school, it has more in common with the Royal Navy than with any pirate ship.

Having come to terms with the fact that you can never truly "teach like a pirate," here's how to get as close as possible:

1. Write a "compact" for your class

The key to making everything work aboard a pirate ship was the "ship's compact." Whenever a pirate crew set out on a voyage or elected a new captain, they would collectively draw up a "compact"—that is, the rules that everyone would follow on board the ship. Crucially, these rules applied to the captain as much as to anyone else. As Captain Charles Johnson, author of *A General History of the Pyrates*, put it, "They permit him to be Captain, on Condition, that they may be Captain over him" (Rediker 65).

This will be familiar territory for many teachers—it's much the same as creating "norms" for your classroom at the start of the school year. The big question here—the one that will determine whether or not you are ready to "teach like a pirate"—is whether you are prepared to be governed by the compact as much as everybody else is.

2. Make important decisions democratically

The highest authority on a pirate ship, according to Rediker, was the "common council, which met regularly and included every man from captain to foremast man" (68).[3] Rediker goes on to say that "The decisions that had the greatest bearing on the welfare of the crew were taken up in open meetings that featured lively, even tumultuous debate" (68).

Captains were routinely outvoted in these councils, which took up decisions such as "who to attack," whether or not to sink a ship they had just plundered, even which direction to sail next.

Rediker again:

> The decisions the council made were sacrosanct. Even the boldest captain dared not challenge its power. Indeed, councils removed a number of captains and other officers from their positions. Thomas Anstis lost his position as captain; he was, as the pirates put it, "turnd before the Mast," that is, made a common seaman on the ship he had once commanded. [...] Shipboard democracy, especially to those who had labored long and hard in a totalitarian work environment, could be intoxicating. Some crews continually used the council, "carrying everything by a majority of votes." Others set up the council as a court. They loved to vote, claimed a captured captain, "all the Pyrates' affairs being carried by that" (69).

My guess is that this is the point where you're most likely to bail and decide that "teaching like a pirate" isn't for you. Putting your class's most consequential decisions in the hands of the majority is risky (not least because of the needs of the students whose vote went against the majority decision). To be honest, I don't know how far down this path I'd be willing to go myself, but I appreciate the challenge that the "pirate's life" presents to my assumptions about how authority (even "democratic authority") should operate.

3. Take control during "battle"

You might be wondering why pirates bothered to have a "captain" at all, but there were certain situations in which the captain's authority was absolute and unquestioned: "*fighting, chasing, or being chased*" (Rediker, 65). In other words, in any kind of battle, the captain's word was absolute and unquestioned.

None of these situations come up very often in teaching, but the classroom has its analogous circumstances: the day of exhibition, for example, in a project-based classroom, or getting everyone back on the bus at the end of a field trip.

What fascinates me about the pirate captain's dual role (basically powerless most of the time, but wielding absolute authority at crunch time) is how it runs counter to an idea I internalized about teaching without ever really thinking about it. I've heard a thousand variations of the idea that you need to make sure students follow your instructions when it's not critical, so that you know they'll follow your instructions when it is critical. Pirate ships ran on the opposite assumption: the crew followed the captain's instructions if and only if the situation was critical. Otherwise, the captain's word carried no more weight than anyone else's. And if the captain couldn't cope with that, well, it was time to elect a new captain!

4. Appoint a "quartermaster"

On a "regular" merchant ship, "quartermaster" wasn't an official officer, just an experienced sailor who other people listened to. Much like most ships, most classrooms have one or two unofficial "quartermasters."

To see what I mean, imagine the following scene in your classroom: you're assigning an essay, and it's due tomorrow. Some kids are complaining that this is too soon, but you aren't paying much attention to them because you knew there would be complaints about this. Then one kid says, "We really *haven't* had a lot of time to collect our research for this," and you suddenly think "Huh, if THAT kid is saying the due date is too soon, maybe it IS too soon." THAT kid is the unofficial quartermaster of your "merchant ship" classroom.

On a pirate ship, the "quartermaster" wasn't just an official officer, they were equal to the captain! Their role was to represent the interests of the crew. The quartermaster was also the most trusted person on the ship, and thus was put in charge of portioning out food and, after a successful raid, treasure.

In a classroom, this means taking the role of quartermaster more seriously than "that kid you implicitly trust." For one thing, it's not up to you to decide who should be quartermaster, it's up to the class! The "quartermaster" would represent the rest of the class, taking part in decision-making with the teacher and helping to decide which decisions were important enough to merit a vote from the "common council."

5. Share out the treasure among the whole crew

Ship's officers made a lot of money in the 18th century, but most sailors were poorly paid, and sometimes not paid at all. On pirate ships, on the other hand, after a successful raid the quartermaster made sure the booty was divided between everyone in the crew. That's not to say everyone got the same amount (for example, the people who actually boarded the ship got paid more) but the differences in payment were relatively small. These allocations

were set down at the start of the voyage in the ship's compact, which, as I mentioned, the crew wrote together. No pirate would have dreamed of setting off on a voyage without understanding (and having a say in) exactly how treasure would be allocated to them and their peers.

While I don't recommend using the term "booty" with your students, it's worth considering what the "booty" is in your class—that is, what is everyone working for? What's the goal that animates your efforts?

The most obvious answer, for better or worse, is "grades." For many students, grades have real monetary value, because financial aid is tied to GPA. So a classroom of pirates would start the year by deciding collectively what should be assessed for a grade, and how.

But while grades are the "currency" of class, as teachers we hope that our students will be inspired by a loftier goal than "get a good grade." This is pure speculation, but I suspect that a big part of the reason that pirate ships seem to have worked so much better than the average utopian commune is that they had a clear shared goal that was more specific than "live in a multiracial democratic social experiment."

Of course, their goal was "plunder other ships for treasure," which is where this stops working as a metaphor for teaching, but every project-based classroom has a similar shared goal, whether it's "put on an exhibit," "stage a play," or "build a submersible drone." If you and your students can come up with a goal that the whole class is excited about and you pursue it as a collective, making democratic decisions along the way, you really will be "teaching like a historically accurate pirate."

So, Should You "Teach Like a Pirate"?

This is a tough one: the amount of authority you would need to relinquish in order to truly be the teaching equivalent of a "pirate captain" is pretty extreme. And, notably, the "golden age of piracy" lasted for eighty years. Ultimately, radical democracy was no match for brutal hierarchy.

The world we live in, and the way we think about it, were shaped not by the pirates but by the nations that stamped them out, so one way of looking at it is that living like a pirate didn't even work for the pirates, so how likely is it to work out for us? On the other hand, given a choice between life as a sailor on a merchant vessel or a pirate ship, I know which one I'd choose, without hesitation. So maybe the most important question isn't "what kind of classroom do you want?" Maybe it's "what kind of classroom do your students deserve?"

I'll leave you with one final thought about pirates. According to Rediker, "'Merry' is the word most commonly used to describe the mood and spirit of life aboard the pirate ship" (72). And we could all use a little more merriment in our lives, and in our schools.

Notes

1. Marcus Rediker writes that when European governments decided to crack down on piracy in 1720 (bringing about the end of the "golden age"), "the final assault was launched in large measure as a response to demands by the increasingly powerful traders in West African slaves" (137). In other words, piracy was eradicated because of the threat it posed to the slave trade.

2. Unlike other groups (most famously the British Navy), pirates almost never forced sailors to join their crews, a decision based on both ethics and practicality (ships work much better if everyone wants to be there).

3. Pirates, like all sailors, were overwhelmingly male, though there were at least two female pirate captains, Anne Bonny and Mary Read. Rediker tells both of their stories in detail in *Villains of All Nations*.

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Above: Students in one of Sean Gilley's classes.

A Weekly Student Survey Transformed My Teaching
It Could Transform Yours, Too

Sean Gilley
Sweetwater High School

Open communication is an essential part of any healthy relationship. However, teachers often find ourselves the only person in the room who communicates. As an eighth grade science teacher, I've come to realize the importance of immediate feedback in the classroom and inviting my students into the conversation not just as thought partners but as leaders of the discussion of what the classroom should look like. I have found a practice that will ensure your students have their voice heard and your practice will continue to improve. The great part is that it will take at most five minutes once every week or two!

That's why I started giving feedback surveys at the end of each week and implored the team to do so as well. The goal was to see what our students felt about our classrooms. I wanted to hear from my students about what was working and what wasn't. The survey had six questions:

1. Is your voice valued in this class?
2. Give an example of how you have felt valued or not in this class:
3. Overall do you feel you can be successful in this class?
4. Give an example of when the teacher has helped you be successful:
5. What has been something you really enjoyed in class this week?
6. If you could change one thing about the class what would it be?

The full eight-grade teaching team met and decided that these questions would be a successful check-in to find out needs to be changed and improved individually. Additionally we saw that we could group the data together to target students who were feeling negative about two or more classes across the grade. We chose to give them every two weeks in google forms and analyze the data the next week in teams.

What took me back right away was the open and honest responses we received. Students were not shy about letting us know what was going well and what was missing the mark. They told me about the lessons they enjoyed, the ones they found confusing, and the ones they wished we had spent more time on. Here are three examples:

> "I am scared to ask questions because I do not like raising my hand"
>
> "I work better with my friends and want to work with them"
>
> "When we are doing group projects I have fun but I do not learn as much as when we do stuff by myself."

My team was built of a veteran of seven years at the school, a former principal turned math teacher, and a second-year teacher. They all had some reservations and were nervous about the feedback, but when we read through the surveys, the team realized how valuable the students' feedback was. They weren't being mean or negative just to be mean. They were simply expressing their opinions and offering suggestions for improvement.

So as a team we agreed on Monday mornings, we would choose two or three items of feedback and display them for the class as the things we as teachers would be working on that week. For example, one week we told our students we would work on the following:

1. Students were asking to work outside in order to get a break from the classroom, so we decided that one class per week would take place outside.
2. Students advocated for doing assessments in partnerships so we as a team designated one "exit ticket" early in the week that students could submit as partnerships, in order to alleviate the stress over a newly-introduced topic.

It was incredible to see students' faces light up when they saw that we had listened to them and saw that they realized this was a partnership now where we worked together to get better not just students but students and teachers. They knew that their voices mattered and that they had a stake in their education.

As time went on, it became increasingly clear that this wasn't just about making changes to the class and improving our classrooms, it was about making more meaningful connections with every student. The feedback surveys also gave us a chance to pull students for check-ins to ensure they felt heard. In our surveys, the students would rate if their voice was heard from one to four. One signified that they had not felt seen or heard in class, while a four meant they felt they belonged and were seen and heard in our classes. We decided as a teaching team that if we had any ones we would sit down with those students and ask what we could do ensure that all students felt like they belonged in our classrooms. Being able to directly address students who did not feel welcomed or heard in our classroom was transformative. I knew exactly what certain students needed and it radically altered how I went about my teaching for not only those students but the class as a whole.

Adding to teachers' workload always seems overwhelming but this quick immediate feedback survey can be implemented seamlessly and can have a large impact on student culture and performance. My team has shown the power of student voice in class and we have seen increased engagement. This is hardly surprising: when students feel that their opinions and perspectives are valued and heard, they are more likely to be engaged in the learning process. They may be more willing to participate in class discussions and activities, leading to a more dynamic and interactive classroom.

Incorporating immediate feedback and student's voice in the classroom is not only beneficial for students, it also helps to create a positive learning environment and improves our teaching. When students feel that their voices are being heard and that their feedback is being taken seriously, they become more engaged and invested in their learning. When teachers use this feedback to make changes in their teaching practices, students see that their opinions matter and that their teacher is committed to their success. This creates a positive cycle because students feel more comfortable sharing their ideas, so teachers learn more. It also makes it possible for change to happen "in real time". This can lead to more efficient and effective teaching practices, which ultimately benefit both the teacher and the students. When teachers can receive feedback quickly and make changes accordingly, they can better meet the needs of their students and create a more productive learning environment. It's not always easy to hear criticism or suggestions for improvement, but when we embrace the feedback and use it to make positive changes, we empower our students and help them succeed.

As teachers, we often rely on our administrations and other teachers for feedback on what is going well and what is not working out in our classroom, but we've never learned as much from them as we learned when we went to the real experts on what's going on in our classrooms: our students.

Above: Students work with a ranger at the Tijuana River National Estuarine Research Reserve.

How to Collaborate With a Park
A Guide for Teachers

James Fester
PBLWorks

CRACK! CRACK! The ice finally breaks after a series of sharp blows from a hammer. A student plunges a plastic bottle into the hole, retrieving a sample of water from the lake that sits across the street from their home. Later that morning the student arrives in class, bottle in hand, and gets started on testing their water sample for phosphorus, chloride, and other common pollutants. Soon the student is discussing their findings with their classmates and postulating not just the sources of the contaminants, but steps that could be taken to reverse them. Soon, they are creating visuals that will be posted around their neighborhood sharing their findings and suggest ways that the community surrounding the lake can help protect its health.

If you're a teacher reading this, I hope a part of you is thinking "That sounds like an awesome thing to do with my students," but I suspect a larger part of you is incredulously asking "What teacher has the time to do this?!?"

In my work coaching teachers his very real and relevant question has surfaced over and over again. It certainly was the biggest challenge I confronted during my decade in the classroom and in all the years I've spent since as an instructional coach. Regardless of where I might be, be it a sprawling urban school district or a small rural school, the biggest challenge that educators everywhere are consistently trying to tackle when it comes to the creation

of high-quality, engaging project experiences for their students is the eternal four letter word; T-I-M-E.

One of the biggest potential time-sucks in project planning is locating, vetting, and integrating relevant resources required for project-based learning. While we want students to lead their own learning, in my experience, students are able to do this best when they are supported by both structures and resources procured by an informed and passionate teacher. If only there was a one-stop shop where lesson plans, multimedia resources, and knowledgeable experts could all be found in service of real-world, project-based learning!

Well, I have some good news for you. There is, and believe it or not, you're already paying for it, just by being a tax-paying citizen!

Established well over 100 years ago, the National Park Service (NPS) has a long and storied history when it comes to educating visitors about the natural and cultural treasures that they are charged to oversee. The 400+ sites that make up our national park system include one-of-a-kind ecosystems as well as historic sites that are critical to the telling of our national narrative. Since a well informed public is essential to the continued preservation of these parks, the NPS has devoted a large amount of time and energy focused on creating educational resources.

After nearly a century of fulfilling its educational mission, the NPS has created what is now considered by some scholars to be one of the largest collections of educational resources in the country, accessible (for free) by every teacher in the nation, and all in service of PBL experiences.

What Parks Can Bring To Projects

If you've ever been to Minnesota, you know about the lakes. Lots and lots of lakes. The centrality of lakes to the culture and lives of everyday Minnesotans makes issues around water quality and water impairment especially poignant, which is why in the fall of 2021, science teacher Kathleen Babich and I decided to place them at the center of her middle school unit on hydrology.

However, developing a multi-week project focused on the impairment of lakes presented three major challenges. First, there was the issue of developing student knowledge of science concepts like the hydrological cycle and the role that "indicator species" play in measuring lake water quality. Then there were the challenges inherent in all inquiry-based work: if the students developed specific questions that Kathleen was unable to answer, it would mean hours of additional research! Finally there was the problem of finding appropriate data to compare their own testing to. Where on earth could she hope to find readily-accessible data on the water quality of lakes?

Getting Started on the National Park Service Educators' Portal

As luck would have it, Minnesota is one of thirty states home to a designated national park, and the one Minnesota hosts is essentially one gigantic lake. Nearly a third of Voyageurs National Park in the far northern part of the state is lake water, and thus, understanding lake ecology is central to the park's educational imperative. By connecting her unit of study to this park (and others!), we were able to integrate several park-developed lesson plans into her project, saving herself an immense amount of planning time. For example, a simple keyword search revealed a collection of resources from Acadia National Park focused on how contaminants like phosphates make their way through a watershed and into lakes. Another resource provided by Wind Cave National Park illustrated parts of the water cycle such as infiltration and how groundwater interacts with lakes.

These resources are just a sample of what can be found on the National Park Service educators portal (nps.gov/teachers), a resource almost as old as the internet itself. The NPS educators portal is, as the name implies, the "portal" to all the NPS's online educational resources, making it a logical first stop. In addition to more than 1100 lesson plans (most of which are aligned to national frameworks such as the Common Core and the NGSS) it provides a helpful index for multimedia content, professional development offerings, and the many distance learning programs offered by the parks (which we will discuss a little later).

The activities and lessons provided on this site are free to download and can help students develop the content knowledge crucial to the formation of solutions or as part of larger inquiry cycles. Many of the lessons can also be used to demonstrate how subject-area specific skills are used outside of the classroom. For example, an elementary school classroom looking for ways to bring attention to the plight of local endangered species might complete the Bison by the Numbers lesson created by Badlands National Park. This lesson, developed by park rangers who help manage the recovery of this iconic north american land mammal, explains how data visualization can be used to illustrate population fluctuation, a skill that is both aligned to elementary math standards and could be used by students to enhance their projects.

Experts At The Ready

The lesson plans that Kathleen found on the NPS educator portal streamlined her planning and enriched her project, but she was still concerned about the unpredictable directions that her students' questions might take them, and she knew she didn't have the level of specific expertise she would need in order to guide her students' research and keep them from either getting stuck

or relying on dubious online sources. So we used the general information number provided on the Voyageurs National Park website and gave them a call, asking to speak to someone with knowledge of the park's work monitoring the water quality of the lakes within its boundaries.

The park connected her with a ranger with expertise in the kinds of water contaminants her students were likely to find in their samples. She was also given an overview of available web resources and important of all, an email from one of the park rangers gained her access to decades of water-quality data collected by the NPS that provided an essential point of comparison for her students who were testing the quality of water from lakes and streams in their own community. Working with the NPS cut her planning time, while adding depth and authenticity to the work—not a bad deal.

Parked in Class—Connecting Virtually to Parks

Kathleen's lake project was awesome. Students were working collaboratively to understand and solve an issue that affected nearly 60% of the lakes and streams in their state while deeply learning science concepts and content. But when she and I reflected on it afterwards, we realized we missed an opportunity to make a more direct connection between the students and the park itself. While we gathered information, resources and data from the park and presented them to the students, it would have been even more powerful to have allowed the students to do that themselves. But outside of loading the students on a bus and driving them north to the park, we didn't see an easy way to foster this connection until we learned about the distance learning programs offered by the park's partner organization, the Voyageurs Conservancy.

While it is estimated that every American lives within two hours of a national park, that doesn't always mean that they are accessible to everyone. Logistics, weather, and, of course limitations due to time, make an in person visit difficult, if not impossible, for some schools and their students, but this is something that park rangers know. In recognition of the difficulty that many students, especially those from underserved communities, experience in trying to visit parks, more and more parks have made the learning resources they offer available through engaging distance learning programs that can be reserved with relative ease, especially during less busy seasons. Generally the programs are delivered by rangers live over video conferencing platforms. Some come with pre- and post- activities that integrate them into units of study or provide assessment opportunities. While many parks have diverse offerings on a number of different topics, some provide more flexible programming that allow students to ask questions or inquire about topics related to their own need to know questions.

On the surface a virtual visit to a park may seem like a poor substitute for

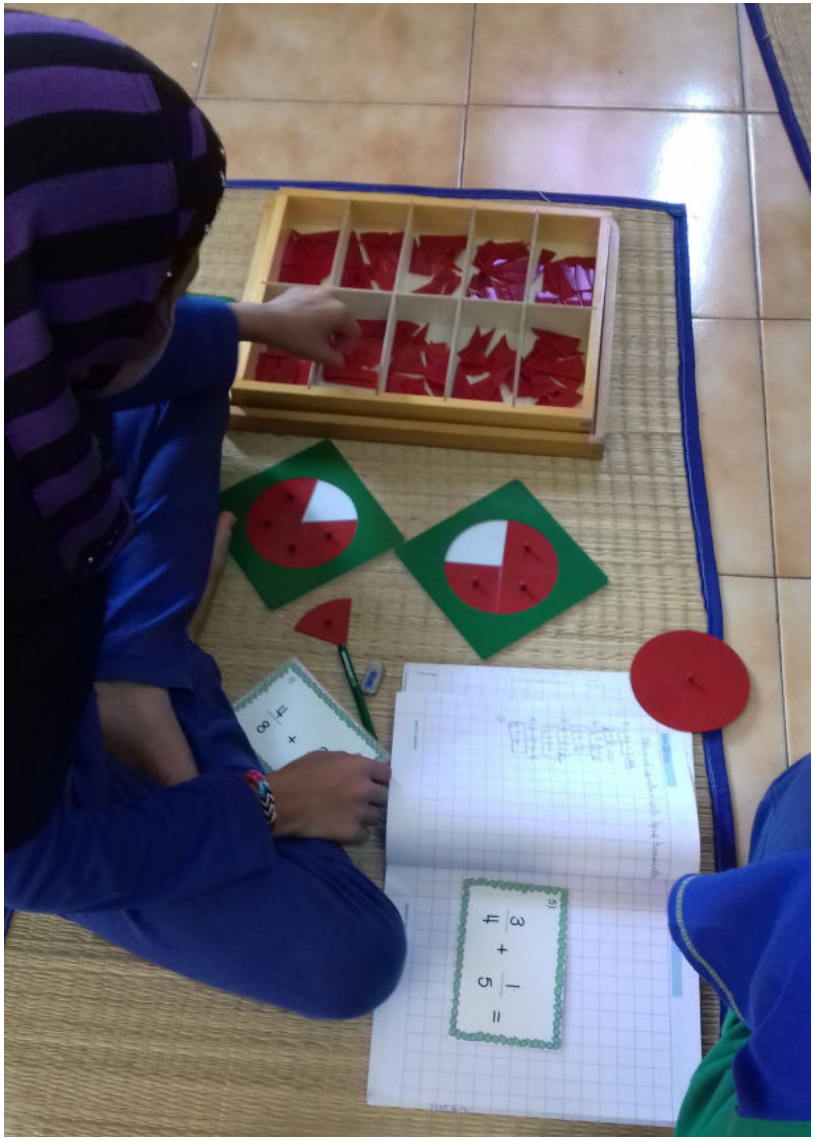
an in-person experience and therefore not worth the planning time. If you feel that way, I encourage you to think of them as their own category of experiences rather than a "substitute" for a trip to a park that you can't do anyway. For many students, a visit virtual or otherwise is a memorable experience. Teachers who have scheduled virtual programs for their students have remarked at how during the lead up to the program they would overhear their students discussing their, "upcoming visit to the Everglades" like they were actually boarding a plane bound for Florida.

Finding these programs isn't always easy as the offerings can change both with the seasons and with the movement of rangers. Starting off by visiting the NPS Teachers portal that has an option for "distance learning" in the "refine search" options. If what you are looking for isn't readily available there, you might try reaching out to the park unit that connects to your area of focus directly and see what they might offer. Smaller park units that don't have the same resources as larger ones might provide their own programs, but only through a direct inquiry.

Conclusion

Sitting at the north entrance to Yellowstone National Park is a stone arch inscribed with the words, "For the Benefit and Enjoyment of the People." While there isn't any evidence to suggest that those words were selected with project-based learning in mind, our national parks continue to prove to be an amazing resource for inquisitive students and their teachers. Hopefully, some of the ideas in this article will be of use to you as you plan your next project or learning experience so that you can help the next generation of park protectors benefit and enjoy these special places.

As for Kathleen and her students, the final products they created we put to good use. After collating their findings and researching how to prevent the accumulation of the pollutants their testing revealed, they posted their work near the lakes they drew samples from in order to help those who live close by to take a more active role in protecting their health and integrity. Simple actions like bagging lawn clippings, carefully disposing of pet waste, reducing the use of salt in the winter could help contribute to the overall health of the waters near their homes.



Above: Students at Al Qamar Academy use Montessori fraction manipulatives.

How Rafia Made It All Add Up

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Hajira Abdul Qayyoom, a fourth grader, was puzzled. She had just participated in an exciting discussion on divisibility rules. Rafia Aunty, her math teacher at Al Qamar Academy, a tiny alternative school in Chennai, India, was not a typical math teacher. She didn't just tell the students how to solve problems. She didn't just show the students how to solve the problems. She guided discussions in which kids figured math stuff out, and then explained their 'A-Ha' moment to the class. But Rafia Aunty had just let her down. Today, the class was learning about divisibility rules—that is, methods for figuring out whether one number is divisible by another. So, for example, the divisibility rule for "two" is that if the last digit of a number is even, it's divisible by two. The class sailed through the divisibility rules for two, four and five, and wrestled with the logic behind the rule for three ("a number is completely divisible by three if the sum of its digits is divisible by three"—why does that work?). They connected the rule for three to the rule for six; the class started up at seven. Rafia Aunty flatly said, "There is no divisibility rule for seven." The flatness and finality of the statement didn't sit well with Hajira. "Why?" she wondered aloud. "Well, why don't you try and find a divisibility rule for seven?" said Rafia, lightheartedly.

That was the spark Hajira needed. She spent the next five days obsessing over the problem amidst reams of paper, half-chewed pencils and scattered notebooks. She sat in the classroom. She sat under the tree. Skipped lunch.

And classes. She was looking for patterns. Rafia had seen what the girl was up to and requested the other teachers to excuse Hajira from their lessons. Rafia made herself available for Hajira whenever the child wanted to discuss something. Then, one day, Hajira came up with an elegant divisibility rule for 7. The rule laid out a pattern for ones, tens, hundreds, thousands and beyond: Here, in print for the first time, is Hajira's divisibility rule for seven:

> The rule splits and multiples the digits in the number in a pattern of 1,3,2, -1,-3,-2 and so on in the following manner:
>
> 1s digit *1
> 10s digit *3
> 100s digit *2
> 1000s digit * -1
> 10,000s digit *-3
> 100,000s digit *-2
> 1,000,000s digit *1
> 10,000,000s digit *3
> 100,000,000s digit *2
>
> The resulting numbers are summed up.
>
> If the resulting number is a multiple of 7, then the number is divisible by 7

Example:

> 1458768374
>
> = 4*1 + 7*3 + 3*2 + 8*-1 + 6*-3 + 7*-2 + 8*1 + 5*3 +4*2 + 1*-1
>
> = 4 + 21 + 6 + 8 +15 + 8 - 8 - 18 - 14 - 1
>
> = 62 - 41 = 21
>
> Since 21 is divisible by 7, the 1458768374 is also divisible by 7

In most Indian schools, math teaching gives centrality to the curriculum, the textbook and the teacher. Math is taught as a set of techniques or procedures to be applied in a given problem. The class learns in a lock-step manner. A concept is taught usually as a set of procedures, sums are worked out and then forward, on to the next concept. Since time is of essence, deep learning is difficult. In a world of 'correct answers', there is little space for students' creative or original thinking. Students are tested frequently, the notion being that testing reinforces the learning. However, this approach has been linked to student passivity, disengagement and higher math anxiety (Hunter, 2012;

Williams, 2013). Anxious students develop negative attitudes towards math, are less likely to use problem solving strategies and perform poorly on math assessments (Lipnevich et al., 2016; Ramirez et al., 2016). A national level conducted study in India found that while students could easily answer rote learning based questions, conceptual understanding or application was sadly lacking (Quality Education Study, 2006). And anecdotally, a common complaint amongst students is that math is hard, boring or irrelevant. Al Qamar was not different in its early years. While younger students learned math using Montessori material, the thirty-odd, upper elementary/middle school students were taught math using traditional curricula. Despite the absence of exams and a presence of discussion in class, math was clearly not a hot favorite. This is a tale about how one innovative math teacher managed to transform the school's approach to math teaching using powerful innovative pedagogical practices.

When Rafia Riaz signed on as a math teacher, she was determined to bring about a change in the students' attitudes. A seasoned educator, Rafia intuitively knew that to change attitudes, kids had to develop a love for math. She knew that kids enjoyed working with each other in groups. Kids relish challenges. And she knew that all kids liked to have a say in their learning. What pedagogues called engagement, motivation, peer-to-peer learning and student autonomy. Rafia may not have known these terms, but she knew that these were required. To create a buy-in for her plan, Rafia first negotiated, advocated, and convinced the rest of the faculty at the school about the importance of inquiry based math, teamwork and fun in math teaching. Her enthusiasm was so infectious that we all joined her bandwagon. Rafia's plan for the fourth through seventh graders was simple. The younger ones still needed to use math manipulatives they had used in Montessori. For the older ones, Rafia adopted inquiry-based math textbooks as a resource. Supplementing the 'formal' learning for both groups were a range of math storybooks, puzzles, math games and other fun activities.

To start off, Rafia changed the physical structure of the classroom to align with her plan. Furniture was rearranged and sets of desks were joined together to create collaboration spaces. Rafia hijacked empty classrooms for her teams to wander off into—to have animated and undisturbed discussions. She encouraged the teams to find quiet spots in the school. There were several occasions when the teams were found sitting outside under trees, in the organic terrace garden and near bushes busy working on math.

Next, Rafia introduced teams in math classes. Her premise was that collaboration instead of competition would provide scaffolding and lead to better thinking. Teams got the resources they needed—calculators, chart paper, stationery and a whiteboard. Initially, Rafia planned the work for each team, but over time, student teams took up the mantle of creating their own work plans. Kids scheduled meetings with Rafia, to update her

Above: Students worki on math on the Al Qamar Academy Terrace

on their progress, thereby maintaining rigor and task focus. When the team faced difficulties, Rafia analyzed the causes and addressed them. When there were internal team issues—conflicts or "lone ranger" work, she counseled and advised. When issues were external—due to the frequent electricity shutdowns, lack of resources or noisy environments, Rafia worked with other faculty to minimize the problems.

The process of mathematical thinking was given high priority. Math concepts were taught as investigations. Students were encouraged to think for themselves and use different approaches including problem solving, modeling and experimentation. Googling was impossible given the nature of the problems. Asking parents was a no-no. Rafia had three clear ground rules: "respectful interaction," "wrong answers are wonderful" and "the means are more important than the end". These guidelines helped reduce the fear factor usually associated with math. Problems were a challenge and setbacks were a part of the deal. Honor lay in trying persistently and innovatively, and not in getting the right answer. Once the allotted teamwork time was over, teams regrouped to share the results of their investigations. Each team had to explain the thinking process they used to solve the math problem to the entire cohort. This, of course, led to animated and sometimes heated discussions amongst the teams—as each group had to justify its method using argument and evidence. Debate was an integral part of classroom discourse. The discussions made student thinking visible and added to the diversity of approaches that students used in problem solving. Over time, the inter-team competition evolved into inter-team collaboration, as students were heard discussing math during lunch break, in their free time and, to my feigned disgust, even during my English class.

The introduction of math puzzles, games and storybooks shifted the notion

that a textbook is the only source of mathematical knowledge. These were arranged tastefully in the main hall which functioned as a library, hangout space and a computer lab. Children had free access to these resources. There was a whole shelf of math stories starting with the Murderous Math series, Life of Fred, Malba Talha, and others. Like the proverbial Pied Piper, Rafia would grab a Tower of Hanoi puzzle off the shelf and start 'playing' with it by herself. Seeing a teacher so deeply absorbed in a puzzle, the students would gravitate towards her with helpful hints and suggestions. Slowly, the group would become engaged as Rafia quietly put posers to them. "Which peg do you need to start with to make the tower in the last one?", "Can you come up with a generic rule for the division of diamonds amongst the pirates?" Her questions would start animated discussions, with kids grabbing sheets of paper and pencils to prove their solution was the right one. The weekly puzzle card was a big attraction as children and teachers pored over a card and tried different solutions. It sometimes took days to crack a problem. Which was fine, because the class had learned about Iranian mathematician Maryam Mirzakhani, who was famed for her slow, deep thinking (and near constant-doodling) and who is the first woman ever to win the Field medal, known as the "Nobel prize of mathematics."

Puzzles afforded children the opportunity to work by themselves at their own pace. Fifthth grader Sarah, who had terrible math anxiety when she joined Al Qamar, used to wait for Monday mornings when the Play with Your Math card was released (Play with Your Math is a website that puts out a digital "card" with an intriguing math problem every week). Sarah assiduously worked on each card through the week, sitting in a corner by herself, and conferring with Rafia when she got stuck. She would try different solutions, think of myriad ways to solve the puzzle. This set her up the kind of sustained thinking required when she encountered the Pirate treasure problem (See Box). Sarah was not content with solving the problem. She wanted to come up with a generic solution despite not having learned algebra.

Rafia shifted the role of the teacher from being a dispenser of knowledge to being a coach and mentor. She became a sounding board, facilitated discussions, provided feedback and gave helpful hints rather than answers. This helped the children construct their understanding using their own thinking rather than passively learning math techniques. Rafia used questions to elicit the student's understanding, make their thinking visible and identify misconceptions. These interactions between students and the teacher added to the democratic culture of the classroom, by reducing hierarchy, fear and other barriers to innovative thinking.

Clearly the children were captivated by the cognitive challenge posed by the math problems, enjoyed the process of inquiry and deriving formulae from first principles. Math became fun and cool. Math was celebrated. They

enthusiastically signed up for online math competitions. Kids thought in math terms "How should you angle a cricket drive to pass over the bowler's head and for the boundary?" "How could you price a muffin so that the profit could be evenly split?". Sure, the cohort didn't cover the range of concepts which their grade level peers in other schools were racing through. We were nowhere close. We sacrificed breadth for depth. And were okay with all the twists and turns that students encountered in their math journey. We knew that through this process children were building a lifelong love of math. The goal of completing the syllabus was peanuts compared to this outcome.

What did the experiment in math teaching lead to in the three years that it took place? First, it clearly led to deeper learning. This showed up in the nature of math insights children developed, examples of which were the divisibility rule for seven and the pirate problem. The engagement with math also fostered creativity. There was a shift in children's attitude to math. The students who previously wouldn't have had anything to do with math were now spotted reading math books and using math manipulatives in the classroom. Rafia recalls how Abi, who earlier would mentally shutdown in math class, realized he was good at estimations. So good at it, he found errors in math textbooks where their calculations/estimations didn't make sense. He was now approaching math as real-life situations and values and not just numbers off a textbook. An element of playfulness was introduced. Some children loved experimenting with math-art building a spatial understanding of geometry in real-time. Others started creating math related board games and their own puzzles. Children developed a sense of persistence as they struggled with challenging math problems for days. Kids like Shahid and Hawa who struggled with arithmetic, found they enjoyed geometry. And excelled at it. Rafia nurtured their sense of achievement with positive feedback. For all these kids, there were no test scores as a reward for their engagement with math and the accompanying struggle. No prizes. But a sense of curiosity and enjoyment of intellectual challenge drove them, as it drives mathematicians all over the world. The impact of the program continued even when the children went off to other schools after Al Qamar shut down. Rafia narrates her experience with Izzy,

> "who slept over math worksheets for two years, only to wake up in Grade six and realize math is also about seeing patterns, and she's good at it. That one observation changed her attitude and from there on it was a two-year journey till she got good at the subject, by choice, competing with kids who had already excelled at Math. Even today though she's back in a traditional system and the Math makes no sense, she's not all lost, and finds ways to understand and proceed. The liking for the subject which she developed in middle school helped her realize the purpose and logic of the subject and keeps her going. Else she feels she may have completely detached herself from it and hated it engulfed by a senseless fear of the subject."

Above: A student experiments with straws to create shapes and patterns.

An interesting and unintended fallout of the experiment was the impact Rafia's experiment had on the girls. Traditionally, girls are not expected to excel at math and, because of the power of teacher expectations, they often don't. However, when they saw their teacher- so passionate about math, these girls became math-mad. They loved math, enthusiastically solved puzzles and transferred their skills to other subjects like history and English. Their sense of self efficacy in doing math shot up. Let's be clear. There were still kids who disliked math. But they were in the minority.

So how did this all happen? Hunter et al. (2016) list three key factors which lead to both math competency and positive math attitudes. The first is innovative and powerful math learning environments. These are built through classroom cultures where children take responsibility for their learning, use a range of practices like discussions, explanations and justifications using

reasoning and develop self-identities as mathematicians. The cultures support risk-taking, persistence, and place a premium on students' thinking process. Teachers communicate their high expectations to all their students, but provide support and scaffolding as needed. The second factor is the use of innovative math teaching practices which promote inquiry, student autonomy and relevance. Inquiry is central to good math learning. Marshall & Horton (2011) showed how time invested in exploring a math concept led to higher cognitive thinking as compared to time spent in teacher explanations. Collaboration is a key innovative math teaching practice. It acts as a form of scaffolding where the intra-mental activity between students leads to higher inter-mental activity for each child (Vygotsky, 1978). Teachers act as co-learners but also use their professional judgment to notice students' thinking, ask probing, open-ended questions and respond to students' reasoning to facilitate the process of student inquiry. Embedded in these innovative practices is a sense of democratic power-sharing, which brings students to the center of the classroom discourse. The third factor is the use of mathematical tasks which promote deeper learning. These tasks are open-ended, messy and allow for several solutions. The tasks do not necessarily emerge from textbooks but are curated from a wide set of resources. Moreover, the tasks are presented thoughtfully to encourage student ownership and inquiry, unlike traditional classrooms where even conceptual math tasks are often simplified and taught as procedures.

Rafia created exactly this kind of a math culture at Al Qamar. She showed kids that math could be fun, she flipped things around to support their learning, and experimented with new ideas. Her belief that "..at the end of day it was we can all do math, we are all good at it, even if only at parts of it. The teamwork helps better the other parts" communicated a sense of confidence to the children. There are other Rafias in a world inundated with unimaginative math teachers. These teachers are beacons of light amidst the metaphorical gloom that math teaching is associated with. However, these Rafias need supportive school cultures, a sense of derring-do among the management who thumb their nose at pervasive cultures of syllabus completion and testing.

Here's to you, Rafia—may your tribe multiply.

Epilogue

Hajira's elegant divisibility rule for seven went unacknowledged by the wider community. In a country with millions of students, who notices one student's breakthrough? How could she have informed them? Whom could she have informed? Retrospectively, I realized that we could have encouraged Hajira to write a paper and send it to a journal. But water flowed under the bridge, Al Qamar Academy closed down and Hajira moved on. She continued her work, trying to find divisibility rules for 11, 13 and 17. Clearly, she still

retains her love for math, and who knows, may well be the next Mirzakhani all due to the spark provided in her early years by a passionate math educator. Hajira's rule appears for the first time in print in this article.

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Trophies created for the Peace and Well-Being Film Project

The Peace and Well-Being Film Project

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One night in May 2023 a high school in Cuernavaca, Mexico, was transformed into a film festival: the walls were covered with film posters; projectors were set up in the screening rooms; the film directors were all assembled, dressed in evening wear for the occasion; statuettes were lined up to celebrate the highest-quality works; there was even popcorn available in the halls! This was the culmination of a transdisciplinary project about peace and well-being. The directors were a group of 117 tenth graders, who had worked in groups of four to create a short film exposing a specific social problem that affected their community and proposing a solution for it. The topics were as diverse as the students: teenage pregnancy, migration, violence against women, racial and LGBTQ+ discrimination, plastic waste, prevention of COVID-19, and bullying.

At the film festival, the students were premiering their films for an audience of friends, families, teachers, and school principals. The audience watched three-to-five minute films in which students showed what mattered to them and how they could help create a world with fewer inequalities, conflicts and suffering. After the screening, the audience had the chance to ask questions to the rookie producers about their process of learning and the technical decisions they made about their films. As the best shorts received their recognition for complexity, authenticity and craftsmanship, people applauded and hugged in joy. Looking at this atmosphere of shining dresses,

laughter and celebration of learning, someone might think that everything was wonderful during the project. But it was not an easy journey. The students had to adjust to a new way of learning, the teachers had to abandon their protagonic role and the mentors had to manage a whirlwind of emotions, just like in a movie that has you on the edge of your seat.

The Challenge of Designing an Interdisciplinary Project With Teachers From Around the Country

The Peace and Wellbeing Film Project took place simultaneously in three campuses of PrepaTec, a private high school with a total of 34 campuses across Mexico. PrepaTec was founded, and continues to be run, by Tecnológico de Monterrey, a Mexican university (which, like PrepaTec, has campuses across the country). The three campuses took part because they volunteered to be part of a pilot program in which they coordinated a transdisciplinary project with the driving question "How can we become peace and well-being builders in our community and beyond?"

The three campuses that volunteered were Cuernavaca, Estado de México and Monterrey. To give a sense of their location, Cuernavaca is two hours from Estado de México by car. Monterrey, on the other hand, is at least ten hours from either of the other two.

This particular account focuses on Cuernavaca, where I work as chemistry teacher and for this particular project I worked as a PBL coach. I was one of fourteen teachers on the campus tasked with bringing this project to life. Our mission was to facilitate a transformative learning experience for 117 10th grade students. We were given this mission in June 2022. We would launch with students in January 2023. We had seven months to plan.

Everyone on the initial team had some experience with "project-based learning," at least according to our own definitions of what that meant, but we quickly realized that designing a clearly structured multidisciplinary project was very different from anything we had experienced before. To get us up to speed, Tecnológico de Monterrey provided a workshop in-person with teachers including Jennifer D. Klein, from Principled Learning Strategies, Inc.

We designed the project over the course of the summer. In November I led a series of PBL workshops for teachers who were going to take part in the project. Unfortunately (and inevitably) just before the project launched, we found out that some of the teachers who were expected to take part had not been included in the November training, so they would need to do all their training once the project was already running.

We were supported with guidance and advice from three department directors, the campus principal and three national directors. These people also provided the materials and spaces for different project activities. The teachers had access to a website where they could find the project overview; the milestones; external PBL resources like the ones from High Tech High, the Buck Institute for Education, Principled Learning Strategies and What School Could Be; protocols and routine handouts for doing gallery walks, empathy interviews, contracts, etc.; and a section for posting the weekly newsletter of the activities and achievements of the project. The resources were there, but putting that into action would be the hard part.

Going Interdisciplinary

The teachers joined a Google Chat group to communicate with each other and plan the lessons and due dates for the products. One of the teachers assumed the role of coordinator. They met monthly by Zoom to discuss the main issues of the implementation with the students, the logistics of different launch events and also just to share their feelings and problems as teachers in a complex situation. At first, the teachers had a rough time talking to their peers from other areas of knowledge. For example, I remember a difficult conversation between a social studies teacher and a Spanish teacher. The social studies teacher was expecting that students would learn how to do research in the Spanish class, but the Spanish Teacher was working on grammar and orthography. Many conversations mediated by the coordinator happened to decide who would be responsible for what.

How did the teachers connect the perspectives of different subjects into a single project? Social studies helped with the research of the topics, since it covered historical conflicts like the war and the economic systems that can lead to injustice and inequality; science gave them the opportunity to understand how health is affected by physical and mental damage, because the content was centered on human anatomy and physiology; math supported the analysis of statistical data from public sources, and the math teachers used data related to the chosen topics of the students to teach basic topics like the representation of linear, quadratic and polynomial functions.

The students had to interdisciplinary solve the challenge of "how can we become peace and well-being builders in our community and beyond?". To achieve this, the students had to work through the following stages:

1. Project launch
2. Video reflection about the launch
3. Inquiry and connection with community partners
4. Writing the scripts, giving feedback and producing the films
5. Public exhibition

Above: Videoconference with Rinas Al Ahmid at the project launch

The Project Launch

The students started the project with a virtual launch event across all three schools. All 117 students joined a videoconference with a Syrian refugee living in Mexico, Rinas Al Ahmid, run in collaboration with 3D Education, a community partner of our school. The students were asked whether they thought their country, Mexico, was a peaceful one. Even though it is widely recognized that there is violence in our country due to drug trafficking, some of the students thought that Mexico was a country in peace because we are not at war with another nation, but Rinas Al Ahmad made them notice that we have a lot of aggressive and violent behaviors in daily life. For example, some students mentioned the verbal violence that can be heard in traffic jams, the bullying in schools and social networks, and the domestic violence that girls and women suffer in many households. After the event, the students recorded a short video where they reflected about the experience, focusing on their main takeaways and wonderings. This was the first time the students shot video for the project. It would not be the last.

Inquiry and Connection with Community Partners

The students felt lost and abandoned at the beginning of the project. They were new to a system where they had to develop their autonomy and agency. At first, some students even thought that the teachers were not doing their

job because they were not "telling them the answers" to the problems they tackled in class. As is the case in many schools around the world, students were normally expected to sit down quietly and listen to the teacher. The teachers were the "experts" in the room and the students captured the knowledge that they brought to the classroom. But in a PBL classroom, the students must be looking for something, they have voice and choice and they push the boundaries of the subject content and standards.

The students went from feeling lost and abandoned to become self-driven and autonomous through the guidance and scaffolding from their teachers. Protocols and routines were useful for the students to start making decisions and structuring their thoughts. Sentence starters helped students to reflect on the project—for example "Today I learned that…", "I wonder if…", and "This is important to me because…" Also (and crucially) the students had the chance to choose a topic they were really interested in. Some of them changed topic along the way, and it was helpful that the teachers were open to that.

As the project progressed, the students engaged in research activities by formulating open questions, looking at data from reliable sources, giving feedback to their classmates and interviewing experts from their community. The students interviewed members from the "LiFE" department of their school, which focuses on student leadership and formative strategies. This department promotes sports and highlights community issues. Some of the staff members of the department are psychologists and school counselors who gave the students a broader perspective on topics like bullying or mental health. This was of great value for the students, because it allowed them to recognize and be aware of the institutional support system that they have in case of any troubles related to their well-being. One system that resonated with a lot of students was TQueremos ("we care about you"), a program that promotes the multiple dimensions of well-being and opens workshops for the students like "Active witness", that teaches them to report any abusive behaviors or dangerous situations in the community. This knowledge impacted the students because in their final presentation of learning, they mentioned these resources widely as a way to address the issues they studied. The teachers learned that the connection with community partners was crucial for creating a better sense of authenticity in the project, and that those community partners can be found first and foremost in their own school community.

Writing Their Scripts, Giving Feedback and Producing the Film

Around the middle part of the semester, the students started to produce their short film by writing a script in their Spanish class and by applying

Film posters outside one of the screening rooms at the film festival

the competencies from their technology class to film and edit their short. An interesting tool for the writing was an Ishikawa diagram that they elaborated to understand the causes and consequences of the specific social issue that they selected. This helped the students organize their thoughts and knowledge, as they had done research for several weeks. Another strategy was the use of a RAN chart created in Padlet, that they could use in all of their classes to structure their thinking and planning for the next steps of the project.

They also created a poster where they summarized concepts and ideas from all the subjects and showed the connections between them. This gave them the opportunity to contextualize the knowledge and see that real-life problems are complex and require the mix of different perspectives and tools to solve them. Through a gallery walk protocol, the students gave feedback to each other to improve the deep and quality of their work.

The students wrote, directed, scored, acted and edited their own films. Some of them even asked their friends, parents or grandparents to act in their projects. The nature of the films was diverse: animated or live-action, with a linear narrative or with flashbacks. The technology teachers were mainly in charge of giving the students advice relative to copyright, technical aspects of editing and being responsible with the content that they will show. For example, they were instructed that no images of guns were allowed. One could see that the students were really committed, as they took their project outside the classroom by involving the community in the filming and the

screening of their end products.

Reflection on the Project

One of the challenges of this transdisciplinary project was assessing common products, like the summary poster of concepts or the script and the short film. For some products, the teachers designed a common rubric so each one of them could evaluate specific aspects of the material. For others, the teacher evaluated only from the perspective of their disciplines; for example, in science class (human anatomy and physiology), the students formed mixed groups to find connections between their different topics and the class content of the moment, which was the brain function.

For the teachers, this project was an opportunity to see their own subject area more interconnected with other areas of knowledge.. You could see the math teachers facilitating protocols not directly connected to math, like the NUF test (novelty, usefulness and feasibility of an idea or solution), or the science teachers giving feedback to the students after watching the short films about social problems like drug consumption or violence. Collaborating with colleagues from other disciplines with a common goal, allowed the integration of the faculty and motivated them to contextualize more their course content and to be explicit about the connections between other areas of knowledge.

During the project, the students had to take on new responsibilities, like setting their own learning goals, writing contracts to commit with their team, and giving feedback to their classmates in a constructive way. Adapting to this new system was difficult for our teenagers, but with the help of the mentoring class they were able to understand the pedagogical strategy and they ended up enjoying the project. They worked through their emotions and the skills to adapt to new circumstances. This was a key component of the success of this project, because the mentors worked closely with the students in order to develop self-management skills, which are key in the context of the project and in real life.

A New Door Opens

We're back at the end of the project: the film festival. The final film has played, the applause has died away. The lights are turned off. The posters of the films stand vigilant on the walls. The teachers take pictures together, proud of the growth of their kids that they have witnessed that night. The parents are praising their children and the educators for the event. A student that won a craftsmanship award for his film asks his friend: "Do you feel sad that you did not win?". The boy, loud and proud, says: "Being here and showing my work to my family and friends, for me, is winning."

Contributors

Melissa Agudelo is co-principal of Lincoln High School in San Diego. Melissa was a humanities teacher and dean of students at High Tech High Media Arts as well as principal of the San Diego Met High School.

Julie Benns is the Director of Communications and Content at NYC Outward Bound Schools. She has over a decade of experience working in nonprofit communications and content strategy, developing creative campaigns that keep supporters connected and engaged. She started her career in journalism, and remains passionate about writing and multimedia storytelling.

Ben Daley joined High Tech High to teach physics as a founding faculty member in fall 2000. He has been a school director, chief operating officer, and chief academic officer for High Tech High and is now the president of the HTH Graduate School of Education.

James Fester is a consultant and author passionate about project-based and experiential learning. His educational experience includes classroom teaching, instructional coaching, technology integration, and most recently serving as a member of the PBLWorks National Faculty. In addition to his consulting work, he collaborates with several educational institutions such as the National Park Service and UNESCO. His writing has been featured by National Geographic, TED-Ed, Edutopia, and in two books published by ISTE. He currently resides in the Twin Cities area of Minnesota.

Krista Galleberg trained as a multiple subjects teacher with San Diego Teacher Residency. She taught fifth grade at High Tech Elementary Chula Vista for two years and earned her masters in teaching and learning through High Tech High Graduate School of Education. She is now a PhD student at Harvard Graduate School of Education, where she studies teacher professionalism.

Sean Gilley has been an educator for over 15 years. He started as a para at San Francisco Unified School District then found his way to San Diego and was an eighth-grade science teacher for the last seven years. He has never been satisfied with what a traditional classroom looks like and when you enter his room that is evident. He looks to continue to try new things in the classroom and have students be given the chance to learn in a variety of ways.

Kate Hogan has been working in education for over 10 years as an education specialist, program specialist and currently, improvement facilitator with the system improvement leads, a collaborative project between El Dorado County Office of Education, El Dorado SELPA and Riverside County

SELPA. She earned a Master's in Education from San Francisco University and a Bachelor's from Occidental College in Political Science and French Literary Studies.

Aneesa Jamal has been involved with innovative work in school education for the past 14 years. She is the founder of Cogitation Club & Al Qamar Academy. In 2023, she was selected as one of the 30 global CEE-Change Fellows by the North American Association for Environmental Education (NAAEE). Aneesa is a NatGeo certified educator for teaching Geo Inquiry, Storytelling using Photography & teaching Climate Change. She also holds micro-credentials from Cornell University for Climate Change & Environmental Education and has completed a certification on Reinventing Schools from Teach for India. An alumna of Smith College, USA & an MBA from the University of Washington, she is currently pursuing her PhD in Education at Universiti Teknologi Malaysia. Her research work focuses on project-based learning, environmental education and climate change education.

Robert Kuhl had a career in education that spanned multiple contintents, teaching in Austria, Venezuela, and the United States before becoming a humanities teacher and then the director of High Tech High Media Arts, a role in which he served for over a decade.

Aurora Kushner is the director of impact and continuous improvement at NYC Outward Bound Schools and leads the Crew Initiative. Prior to this role, she was an Instructional and Leadership Coach for 10 years, also at NYC Outward Bound Schools. Before coming to NYC, she taught high school and was a founding faculty member of a secondary school in Massachusetts. She is particularly excited about the intersection of deeper learning, equity and continuous improvement—and how schools can create the conditions for all students to feel a sense of belonging, agency and engagement.

Eileen Landay was the clinical professor of English education at Brown University, director of Brown's MAT program in English education and Brown Summer High School, and senior lecturer in education for over twenty years. During that time, she co-founded and was faculty director of the ArtsLiteracy Project, which was a recipient of the President's Commission on the Arts and Humanities "Coming Up Taller" Award in 2005. She is the author of numerous books and articles and consults regionally and nationally on adolescent literacy development, arts integration, and English education. She holds an M.A. from the Bread Loaf School of English, Middlebury College and an Ed.D. from Harvard Graduate School of Education.

Dean May is an artist based out of Southern California. He is currently the lead technical artist at Aquifer Inventions, and has taught at Laguna College of Art + Design and Riverside Community College. All due respect to Ilya

Repin, whose painting "Reply of the Zaporozhian Cossacks" stuck with him through art school and immediately came to mind when he illustrated "Teach Like a (Historically Accurate) Pirate."

Sandra Park is a co-founder of the Improvement Collective and National Faculty at the Carnegie Foundation, where she previously worked as the director of external offerings and partnerships as well as the director of the foundation's Building a Teaching Effectiveness Network (BTEN). Sandra previously taught elementary school in Oregon, Maryland, and Washington, D.C., and was director of programs at First Graduate in San Francisco. She holds a Ph.D. in education policy from UC Berkeley, and an improvement advisor certificate from the Institute for Healthcare Improvement.

Joaquín Ramírez Ramírez trained as a biochemist with Instituto de Biotecnología (UNAM). He taught chemistry in ninth grade at a private middle school in Cuernavaca, México, for a year. He has been a full-time science teacher for almost four years at PrepaTec (Tecnológico de Monterrey). He is studying his Master´s in Education at Universidad Tecmilenio, where he designs interdisciplinary learning experiences using PBL.

Alec Patton is the editor-in-chief of *Unboxed* and host of the High Tech High *Unboxed* podcast. Before that, he taught at High Tech High North County and High Tech High Chula Vista.

Jonny Soto-Altrogge has been at NYC Outward Bound Schools for nine years in numerous roles—instructor, course director, site manager, and now as crew coach supporting schools to implement crew. He also works as a racial equity consultant and facilitator at True North EDI where he helps organizations create and navigate equity initiatives. He utilizes his previous role as an instructor and his racial equity work to meet schools where they are, and recognizes that for there to be positive impact on students, work must start with adults.

Kurt Wootton is co-founder of Habla: The Center for Language and Culture in Merida, Yucatan, Mexico and co-founder of ArtsLiteracy Project at Brown University. He has piloted several lab schools in the United States, Brazil and Mexico and currently facilitates highly engaging education initiatives for educators in New Orleans, San Diego, Chicago, and Merida. *The New York Times* wrote, "Mr. Wootton remains convinced of education's power to transform lives. He has changed his tool of choice, however, from a mirror in which students see only reflections of themselves to a window that opens onto the rest of the world." He lives with his family Sandra, Luis, and Marimar in Merida, Mexico.

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Unboxed welcomes submissions from teachers, administrators, teacher educators, policymakers, researchers, and other informed observers of education. In addition to reflections on practice, submissions may include essays on purpose and policy, accounts of teacher research, scholarly articles, project design tools, photography, art, and student work.

Send submissions to unboxed@hightechhigh.org or to the HTH Graduate School of Education, Attn: *Unboxed* Submissions, 2150 Cushing Road, San Diego, CA 92106.