

# KALEIDOSCOPE:

EDUCATOR VOICES AND PERSPECTIVES



Photo by Genaro Vavuris



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# KALEIDOSCOPE:

EDUCATOR VOICES AND PERSPECTIVES

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# FROM THE EDITORS' DESK: WHAT COMES AFTER THE MARCH FOR SCIENCE?

# FROM THE EDITORS' DESK: TEACHERS TELLING TRUTH

**Kate Blaske**, a Knowles Senior Fellow, is a co-editor-in-chief of *Kaleidoscope*. She most recently taught AP Chemistry at Avon High School in Indiana. **Reach Katie at [katie.blaske@kstf.org](mailto:katie.blaske@kstf.org).**



## Ideas, big and small, for supporting STEM in our communities.

In April 2017, a March for Science was held in Washington, D.C. and several other locations around the United States and the world. I've been thinking long and hard about this march and all that it entails.

With so many different issues arising from our current cultural and political reality—issues relating to race, gender, economics, access, the environment (among others; I could spend a whole page listing them)—the broad issue of “science” or “STEM” seems slightly out of place. And while a march can bring people together, as we saw with the Women’s March on Washington and the myriad satellite marches in January, it also often raises the question of “what next?” As of late, the next step has involved contacting governmental representatives, monetarily supporting action groups, and writing on blogs or social media with the goal of educating others. All of these are worthy efforts, but as a science educator, I know that experiences are what help people learn.

During a conversation with an organizer of the March for Science movement, I was told that educating our citizens is too defensive of an action, that in order to have change you must take offensive actions. As an educator, I don't know of any strategy as offensive as working in education. I feel this opinion is so often held, if not always voiced—America's teachers fight an uphill battle, not only to be taken seriously, but to have any sort of support.

So help me prove to this person that education is a desperately important piece of the equation. As

Headshot by Andrea Cipriani Mecchi

an educator, you do so much already. Ask your colleagues, your friends, your numerous networked acquaintances to help. Do this by doing something to promote STEM in your community—big or small.

If you have science knowledge, call your local school district and volunteer to be a speaker or do experiments with students. Call your local library or community center and ask to host a “Q and A” session about a science topic that is dear to your heart. Loan a fantastic nonfiction STEM book to a friend (or the kid of a friend) and tell them “you have got to read this!”

If you are a supporter of science, seek out someone to share their knowledge with you. Attend science outreach sessions at your local libraries or community centers. Go out in nature with a guide book and identify species. Learn about cloud formations. Read the ingredients in your food and research them—really research them so you can learn more than fear of the word “chemical.” Tutor a student who is struggling in science at school. Support the science teachers at your local school. Call or email them to see what materials they need or help you can provide. Listen to their stories and hear their words as they build a community of thinkers and questioners in the students of the next generation.

Teach your kids to question the world around them, and when they don't have an answer, how to experiment or research to find the answer. If the citizens of this country and the citizens of the world knew and trusted in the power of science as so many science educators do, many of the current political, economic, and environmental issues would be solved.

If everyone did one of these things, think how many people would be affected. If everyone did two things, wow. Maybe we just might be able to make a difference.

**Kate Blaske**  
Editor-in-Chief

**Kirstin Milks**, a Knowles Senior Fellow, is a co-editor-in-chief of *Kaleidoscope*. She teaches AP Biology and Earth/space science at Bloomington High School South in Indiana. **Reach Kirstin at [kirstin.milks@kstf.org](mailto:kirstin.milks@kstf.org).**



## Stories from classrooms hold us all accountable.

We're in a time in our national consciousness in which, one of my students recently noted, no one is listening and everyone is waiting for the opportunity to speak.

It certainly felt that way at a rally in my hometown this winter when a young woman took the microphone and was initially too quiet to hear. The crowd rustled, many people shouting brusquely for the speaker to get louder. One gentleman, standing behind me, told her at the top of his lungs to use her “big girl voice.”

But then the speaker started to tell a story from her childhood: the story of being a Syrian refugee. As the crowd strained to listen, this brave young person described what it was like to face, among other hardships, visits from members of the American and European press. How she stood, time and time again, hungry with her clothes stinking, staring into the well-meaning faces of sleek, immaculately-dressed foreigners. How she felt when her family finally came to the States and found such bounty and opportunity.

By the time she finished speaking, the crowd was so silent I could hear the snow falling on the shoulders of my jacket.

Today's discourse in the educational landscape continues to discount messages from the

Headshot by Andrea Cipriani Mecchi

people who know the system the best: teachers. Sometimes, like at the rally, it's because the speaker's words are too quiet to hear, or are drowned out by the words of others. Sometimes it's because someone's words are hesitant and unpolished. Sometimes it's because the words just aren't there; with the ever-increasing demand and pressure on classroom teachers, finding the time and space to formally reflect can itself be a challenging task. Most alarmingly, though, it's because our culture has increasingly let others speak for teachers and, in parallel, our schoolkids.

Every word in the journal you're reading is directly from a teacher—unfiltered by researchers, politicians, or consultants. Our editorial team is committed to promoting stories from teachers and classrooms because they inspire, challenge assumptions, and hold us all accountable for what happens in America's schools. We hope you'll join us in reading, writing, and thinking more about teaching and learning from the perspectives of the professionals who know it best.

**Kirstin Milks**  
Editor-in-Chief



# RAISE YOUR HAND

## STUDENT ADVOCACY IN UNCERTAIN TIMES

In "Raise your hand," we ask for short responses to a pressing question facing teachers. These are difficult questions, often without a satisfying answer, but we hope these reflections will help you develop new ideas, build empathy, and start conversations with students and colleagues.

**Question:** Though we'd sometimes like them not to be, our classrooms exist within the broader local and U.S. context in which we live. How is this current social and political climate, where so many people have seemingly conflicting views, entering your classroom? How are you (or people you know) advocating for students? What actions have you taken (or have you seen taken) on behalf of students to support them?

Many of my students are currently enrolled in the Deferred Action for Childhood Arrivals (DACA) immigration program. Political shifts have left students uncertain and fearful. I have students who are struggling with a future where they might lose work permits, a future where keeping their families together is less certain, and a future that might deport them to countries that they do not consider home. I struggle to face my students daily and push them to focus on content when I know they are preoccupied with issues that are so much bigger. I try to remind my classes to focus on what we can control: how we treat each other, what issues we stand up for, how hard we work, and how we support our community. Is it enough? It doesn't feel remotely adequate.

**Cacia Steensen, Knowles Senior Fellow**

I teach in a rural, mostly conservative area, and I co-advise the GSA (Gay-Straight Alliance). Before the election, those students mostly just wanted a safe place to talk and be themselves. I've seen a shift this year. Students feel more compelled to advocate for themselves. We try our best to support that, but their project ideas are not always met with acceptance from the district. Students are struggling to find their voice and place in our community. Other students use derogatory and exclusive language that they see and hear public figures using. I know my support helps, but I also know it's not enough.

**Beverly Stuckwisch, 2012 Knowles Teaching Fellow**

A large fraction of my students are immigrants and many are undocumented. Each new piece of news sends small shock waves through our student population, and I feel unprepared to help them cope as I'm not even sure how to cope with it myself. Many students try to make jokes about it, but behind the jokes are real fears about what will happen to their peers, their families, and themselves. Other students have lost motivation; they ask, "Why should I take AP Chemistry next year when I'm just going to be deported?" I'm still trying to find my footing in this political climate and figure out how I can help my students. I push them to continue to challenge themselves in school as more education can only help, no matter what happens. I've been assisting as many students as possible with the college application process and have met with the Massachusetts Immigrant and Refugee Advocacy Coalition to try to organize a training for teachers at our school around what rights immigrants have and what we can do if a student has an immigration crisis in their family. It still doesn't feel like enough.

**Shannon Morey, 2015 Knowles Teaching Fellow**

I work in a suburban charter school with a classical curriculum. A colleague and I started a diversity club at the request of students so they could discuss challenging social and cultural topics. At the charge of our charter system, even within clubs, we must draw from historical and classical literature for sources to discuss together. We have centered our discussions on



readings from Mary Wollstonecraft, W.E.B. Du Bois, Plato's Symposium, and other classics. Our students are finding that they are able to draw from these and similar classical sources in order to have rich conversations about contemporary topics such as women's rights and pay equality, racial inequality, and LGBTQ+ identity.

**Ian Caldwell, 2012 Knowles Teaching Fellow**

### CITATION

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# BEING OKAY WITH IMPERFECTION IN MY FIRST MONTHS OF TEACHING

BY MARIA CHAL



**Maria Chal,** a 2016 Knowles Teaching Fellow, works at Cristo Rey Boston in Massachusetts, where she teaches biology and AP Biology. She also coached the women's soccer team at her school and works as a yoga instructor in her spare time. Additionally, Maria helped start a school in Buseesa, Uganda in 2014, which serves 180 elementary students. She returns there every year and works closely with the teaching staff in Uganda through the nonprofit organization Buseesa Community Development Centre. **Reach Maria at [maria.chal@kstf.org](mailto:maria.chal@kstf.org).**

**"Well, you shouldn't be a good teacher yet. It's your first year."**

It's early October. My teaching coach is in my classroom, again, as my students work in groups to prepare presentations on various types of natural selection that are apparent in the present day. One group discusses the sickle cell trait and is curious about its inheritance; another student explains to me how HIV medications stop working as the virus evolves. But my eyes dart around the room—one student is wandering from table to table, several students have their cell phones out, and three groups are calling for me to come help them. I rush around the room, hurrying through each interaction without really engaging with my students or encouraging them to explore their questions. I feel frantic and frustrated that not all my students are engaged, and only half did their preliminary research, which had been assigned for homework.

Later that week, I meet with my coach to discuss the lesson and my teaching goals. "It seems that you are so stuck on the few things that are going wrong in your classroom that you aren't seeing the many things that are going right," my teaching coach writes after this evaluation. This line sums up much of what the first few months of teaching have been like for me. I've been a high achiever for as long as I can remember. Despite my awareness that teaching was going to be challenging, it's proven much more daunting than I had expected.

My usual "hard work equals success" formula hasn't played out, and I'm left feeling defeated and hopeless in my job for the first time in my life.

It's early November, and my Advanced Placement (AP) seniors are frustrated with the gene database we've been using to investigate evolutionary relationships. Students are in my room, rushing to turn in late work before I jet off to the airport. I'm on my way to Denver for the National Association of Biology Teachers (NABT) conference, overwhelmed as I have been since early September—this time because my grades are due Monday morning and I will be busy all weekend. Despite my stress, I'm excited to learn from so many impressive and experienced teachers.

I check in at the conference information desk and begin to notice all the biology displays, teaching supplies, and people meandering around the big conference hall. I slip the lanyard they hand me



around my neck. It says biology teacher under my name, and I feel proud to own that title. I'm met with hugs and stories from other teachers as soon as I arrive, and we quickly begin mapping out our workshopping plans for the next two days of teacher professional development. I want to learn more about aligning AP standards and curriculum, using scientific practices, and creating student-centered lessons. One workshop talks about math computations and enzymes, and I fail to see how I could use what the presenter is saying in my classroom without designing myriad scaffolds for my seniors. Two other teachers propose literacy strategies for increasing student comprehension and making thinking visible. It makes so much sense that I gather up all the resources they've brought to share. In every presentation, I jot down notes and leave with scrawls of ideas, unsure of how I will implement them all on Monday morning.

Similar to many of the teachers attending the conference, I approach my practice of teaching with a growth mindset, recognizing that there are always ways to improve my pedagogy, classroom culture, my relationships with kids, behavior management, my use of scientific practices, assessments, scaffolding—the list goes on. I've never had a problem listing the things that I'm not yet good at, the things that I should do better, the things I should work on. As I stroll from workshop to workshop, the list of "things I should be better at" grows longer. I can't help feeling overwhelmed by the new ideas and the reality of implementing them in my own classroom back in Boston.

On my way to yet another informational session, I

get caught up in the hallway chatting with Jim Clark and Samantha Johnson, two veteran biology teachers whom I can only aspire to be like one day. Both of them interviewed me during KSTF's interview weekend. Our discussion starts conversationally, as they ask me about my new job, teaching AP Biology, life in Boston. I begin to describe my struggles teaching AP Bio, my lack of confidence, my plethora of failure.

It doesn't take long for Jim to offer a kernel of wisdom, as he often does, to our conversation. It's perhaps the most important takeaway from the entire conference: "Well, you shouldn't be a good teacher yet. It's your first year. It takes 10 years to really know what you're doing," he states quite candidly.

It takes me a moment to really process the mixed reaction I have towards what he is saying. I want so badly to be great right now, and to give my students everything that they need to be successful, but that's not really the way learning works, even for teachers.

Why is it that I expect to be as good a teacher on my first day on the job as I would like to be on my last? This self-expectation is not only unrealistic, but also discredits the knowledge and expertise that veteran teachers have and develop through years and years of trial, error, and growth. Learning to accept my imperfection as a teacher, and to strategically learn to grow, fixing one or two dilemmas at a time, may be the only way that I will make it in this challenging profession. And, honestly, the ability to grow and improve is one reason why I'm called to this profession; accepting that I'm not perfect yet is part of this equation.

After a long weekend away from my students, I am excited to greet them Monday morning as a slightly less hypocritical teacher. One who is willing to do the same thing that I ask of my students—to try, to fail, and to grow because it's okay to not be perfect. In fact, imperfection may even be integral to the process of learning. This perspective gives me a new hope for the teacher I might be one day, not tomorrow, or next year, but 10 years down the road, when maybe I'll finally know what I am doing.

## CITATION

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# ARTS INTEGRATION IN STEM

BY ANGELA LOU



**Angela Lou,** a 2012 Knowles Teaching Fellow, is a part of the STEAM department at Boston Arts Academy in Massachusetts. She teaches biology, geometry, and engineering, in addition to leading an advisory and co-teaching a reading and writing class. **Reach Angela at [angela.lou@kstf.org](mailto:angela.lou@kstf.org).**

## STEM through the arts engages students and requires less of a leap than you might think!

How can the arts illuminate the STEM field, or the other way around?

As a biology, engineering, and geometry teacher at a public arts school in Boston, I explore this question daily. In fact, we math and science teachers at Boston Arts Academy call ourselves the STEAM team, which stands for—you guessed it—science, technology, engineering, arts, and math. Many people might wonder why teachers would bother integrating the arts with STEM. I do, too, especially when we've seen so few examples of deep arts integration in education. After all, how much does a student really get out of making a pretty poster or reciting a rhyme?

As an artist at heart, however, these questions percolate a little longer in my mind. I like to ask, how could a dancer interpret fractals, or a musician explain Pascal's Law? Designing curriculum with these cross-disciplinary connections is not as foreign as it sounds! I use the arts to tackle challenges that all teachers face, such as student engagement, differentiating for all learners, and teaching collaboration skills in project-based environments. Any teacher can use these arts integration strategies!

### Increasing student engagement

One way I've successfully engaged my biology students in claim-evidence-reasoning practice is through mock patient interviews at the end of our neurology unit. Properly scaffolded, students get to demonstrate their understanding of neurological disorders through theatrical expression. For example, as student-physicians, they practice questioning patients, gathering evidence, and defending their diagnoses (see Figure 1). As student-patients, they figure out how to coherently express symptoms of a neurological disorder, such as retrograde or anterograde amnesia, aphasia, or prosopagnosia.

I do a fair amount of scaffolding to help students develop a depth of knowledge for the disorders and also empathy for the patients. In fact, students spend two weeks learning about brain functions and neurological disorders before they are ready for mock patient interviews. Teaching students to become empathetic actors is just as important as their knowledge, and is a challenge I tackle with a homework assignment. Students choose one neurological disorder

Doctor's name: _____	Date: _____
Patient 1: _____	
Doctor's notes: _____	Diagnosis: _____
_____	Evidence (how do you know it's not some other digestive system disorder?):
_____	1. _____
_____	2. _____
_____	3. _____
_____	4. _____
_____	

Figure 1. During the mock patient interviews, students practice claim-evidence-reasoning skills with this scaffolded patient chart.

and write a reflection on its impact on the day-to-day lives of people who are affected (see Figure 2). What challenges might a person who has a neurological disorder face that a typical person might take for granted? What is daily life like for this person? In this assignment, students also reflect upon what it means to have a respectful bedside manner. I encourage them to find a balance between scientific fascination and humility when working with life; they hopefully recognize that there is space for humanity in academic pursuits. On mock patient interview day, students enter the classroom rife with excitement. They have looked forward to this day as a way to show me how much they have learned about the brain, and they get to express their learning creatively! I sit amongst the physicians as patients enter our office one by one. Students acting as patients take a seat in the center of our classroom, where all physicians have access to question and perform tests on them. I only occasionally facilitate with questions if the dialogue needs a bit of a push in a certain direction.

One challenge with brain disorders is distinguishing one from another. For

Preparation for Patient Interviews

Instructions: Write a piece that expresses a day in the life of this patient. First, choose a neurological disorder that this person lives with. Address these two questions:

1. What would it be like to wake up and do their morning routine? What would it be like to navigate complex social situations, such as the first day of school?
2. Imagine them visiting the doctor's office for the first time; what would they say? What questions might the doctor ask?

You may choose any of the following formats:

Journal entry	Patient interview script	Dialogue	Comic strip
Storyboard	Movie script	Monologue	Short story

Figure 2. The night before mock patient interviews, students complete an assignment that prepares them to represent a patient empathetically and accurately.

example, a person diagnosed with anterograde amnesia is unable to form new memories, while a person diagnosed with prosopagnosia has trouble recognizing faces. Complex questions arise, such as: if a patient does not recognize you, is it because they don't remember your face, or they don't remember having met you at all? In these cases, I prod the students to ask ever-more specific questions or perform cognitive tests on the patient. I have seen my students ask patients to draw an image on the board from memory, or even pull in other students to test a patient's facial recognition abilities. It is great fun to see what they come up with to test and rule out diagnoses!

### Differentiating for all learners

Another great teaching challenge that I address with arts integration is differentiating for all students

Mini Project options: (about 1 hour each)	Full Project options: (about 2-4 hour)
<p><i>Make a Kahoot quiz.</i> 20 questions minimum</p> <p><i>Annotate an existing dance with its transformations.</i> Find a dance on YouTube, then, describe in what sequence transformations are used.</p> <p><i>Take pictures of transformations/tessellations you see in everyday life and in nature.</i> Create a film or slideshow of these images.</p> <p><i>Create tessellation artwork.</i> Expect to spend 1-2 hours on it; include color.</p> <p><i>Create a comic explaining the transformations.</i> Use a site like <a href="http://www.bitstrips.com">www.bitstrips.com</a></p>	<p><i>Make a film of transformations.</i> Can be a YouTube lesson that you teach. Can be a news anchor interviewing the different transformations. Can be a stop-motion animation of transformations - try the app "Stop Motion Studio"</p> <p><i>Make a choreographed dance.</i> Perform or film it. Include subtitles for extra credit</p> <p><i>Create a transformations board game.</i> Must include playing pieces and instruction manual.</p> <p><i>Compose and perform a song</i> You may also film the song</p>

Figure 3. Students choose a combination of projects to demonstrate their understanding of the geometric transformations. They may choose two mini-projects or one full project.

***I use the arts to tackle challenges that all teachers face, such as student engagement, differentiating for all learners, and teaching collaboration skills in project-based environments. Any teacher can use these arts integration strategies!***

in a heterogeneous learning environment. I have found that arts integration is especially powerful for learning when it is coupled with student choice (see Figure 3). When given options in their learning, students can engage with the material on their own terms. You can think of this as the 'low threshold' in the phrase 'low threshold high ceiling' commonly used amongst math teachers.

For example, at the beginning of the geometric transformations unit, I let students decide how they wanted to demonstrate their understanding. Dancers interpret dilations, translations, reflections, and rotations in short choreographed pieces. Visual artists illustrate these four concepts with captioned comics (see Figure 4). Musicians wax poetic about the geometric transformations. However the ideas



Figure 4. A freshman uses her visual arts skills to illustrate 'reflection.'

are expressed, each student engages in the same material but in very different modes. As you might imagine, creating rubrics for each of these projects would be a total time drain. So I don't sweat it. The purpose of these options is for students to demonstrate a conceptual understanding of the transformations—not the technical details of how to execute them on paper, which I might assess with a traditional paper-and-pencil quiz. Through these projects, students can therefore meet the material on their own terms. When projects are due, we also get to build community by presenting and appreciating each other's work!

**Teaching students to work together on complex projects**

Another great pedagogical challenge: how do we teach students to work together on complex tasks? Many of us choose to assign students to specific lab roles such as recorder, materials manager, reporter, and so on. I have seen teachers take this scaffold a step further with group contracts. These strategies are useful and, I believe, necessary for some class assignments like time-sensitive labs. However, they can also stifle organic interactions by taking important decision-making opportunities out of students' hands.

One answer I've developed to this dilemma is through my biology students' "Central Dogma Choreography" project. I give students one week to create a three to five minute film that represents the flow of cellular information from DNA to RNA to protein. The week's work serves as both a learning activity and summative assessment, since students have to identify and fix any misconceptions that arise throughout the choreographing process. In order to encourage complex group work, I add an additional challenge to the mix: students must work together as a class to produce just one film.

When I introduce these parameters, hands immediately shoot up. Will we want narration? What about music? Who is going to act, and how will we physically represent DNA, the nucleus, transcription and translation on film? I allow students time to brainstorm their vision individually and then share out as a class (see Figure 5). Once those ideas start to congeal, other problems arise: who's on props? How can we synchronise our choreography and music if they will be recorded separately? I let these questions

Central Dogma planning Name:		
Item/Notes	To do/when	Who's on it?
Equipment - cameras? Microphone?		
Setting - out/inside?		
Props - ??		
Choreography (general overview) - ??		
Narrator - ??		

Do Now: How do you envision using your ART in our DNA choreography project? How can you contribute your artistic talent?

- Visual Arts
- Music
- Dance
- Theater

Figure 5. Students brainstorm their project visions and potential contributions.

pop up organically, just to the point where students are interested, but don't have all the answers yet. When given a good balance of scaffolding and artistic freedom (more on scaffolding below), my students tackle the challenge with great zest! I think the most important part for them to understand is that they need each other to succeed, and that each person will and is expected to contribute a valuable skill. I therefore make sure students spend time thinking about how they envision themselves contributing to the project, and have them share these ideas publicly.

Some people might be wondering at this point how we avoid a situation where a only few students are doing all the work. With this in mind, I give students a set of options to work from, and ask them to envision how their choice would make the class's product come together (Figure 5). Some students may step up as directors and choreographers, while others choose to record music or write lyrics. Others feel more comfortable behind the scenes with props. Whatever their role, they have chosen it and have time to think about how their contribution is essential to the project.

Our extended debriefing process is central to making this week work. I need all students to be on the same page when we discuss our progress, contributions, and expectations each day. There are three main strategies I use to ensure students are ready to work the moment they enter class. First, I set aside time each day for students to think about and articulate their design decisions with each other. At the

beginning of each class, students look at the calendar of remaining days along with a list of potential tasks (see Figure 6). The 'Do Now' assignment is to write in the tasks they want to prioritize for the following days.

We spend the first 20 minutes of class setting goals and organizing roles, which is facilitated by their Do Now (see Figure 6). My second strategy is to have student leaders facilitate these class debriefs. When students lead their peers, it creates an environment where peers start holding each other accountable. Finally, I require student debrief sessions to start with shout-outs to each other. This sets a positive tone before we get into nitty-gritty details of what needs to be done as the deadline looms. Through this extended debrief process, students practice listening to each other and compromising on important decisions.

I've actually been surprised to see that the theater students don't necessarily demand to direct or act in the film. While they are willing to take on these roles, I have been pleased to see people step up and step back as they negotiate their responsibilities with each other. This past year, a trio of directors emerged: a musician, a thespian, and a dancer. A visual artist worked on the voiceover narration, and the rest of the students fell into filming, props, music recording, and editing.

I always stop the students' work 20 minutes before class ends for clean-up and a whole-class debrief. This student-led discussion is intended to figure out

Final Project Calendar		
Do Now: Use the calendar below to figure out and fill in what we need to do and when.		
Today (80 mins)	Wednesday (105 mins)	Thursday (80 mins)
Tonight	Wednesday night	

Some reminders: PowerPoint, Upload to YouTube, Record Narration, Film Translation, Stitch scenes together (edit video), Record music?, Edit narration and music over video

Figure 6. Students prioritize the work they think should be done that day in a blank calendar. I modify the reminders on the bottom based on their previous day's accomplishments and their stated goals.



what adjustments will need to be made. With the deadline looming and idea implementation in full swing, students learn accountability, complex task management, and cooperation skills.

**Yes but...how?** I can imagine a few readers wringing their hands at this point. No rubric? Letting students run the show for a whole week? What if the patient interviews get derailed with irrelevant questions or overly exuberant acting? As you might imagine, integrating arts into academics asks teachers to relinquish some control over their classrooms. This is scary. As a type-A planner, I get it. There are days when I fret over how to manage the creative process—are they goofing off, or do they just need space to think outside the box? Or, are these two processes in fact mutually exclusive? The reality is that there are days when I don't think explicitly about big STEAM projects because I need to focus on standardized testing.

For me, though, the risks are totally worth it. My goal is to use the arts to improve my teaching in three ways: increasing student engagement, differentiating for multiple learning abilities, and teaching team-work skills. In fact, I feel that I am just scratching the surface of STEAM teaching. There are endless directions I could explore. For example, I could use common language with the arts faculty to teach growth mindset. In some ways, it is easier for students to track their own growth over time in their arts practice. How, then, can I help students recognize that their growth is not limited to the arts, but is present in whatever they choose to practice?

So far, I have used the arts as a currency to engage my students in math and science. Another STEAM avenue to explore is how and when to apply scientific thinking to the arts. I wonder what might happen if STEM skills cross-pollinated the arts world. What kinds of design connections could students make if we asked them to think like engineers when creating an arts piece? Or could students use their arts to take a stance on public issues, such as urban planning, genetic engineering, and space exploration? With STEAM thinking, the possibilities are endless!

## CITATION

Lou, A. (2017). Arts integration in STEM. *Kaleidoscope: Educator Voices and Perspectives*, 3(2), 7–11.

# AN HONEST LOOK AT A ONE-TO-ONE CLASSROOM

BY BEVERLY STUCKWISCH



**Beverly Stuckwisch,**

a 2012 Knowles Teaching Fellow,

teaches chemistry, AP Chemistry, and algebra at Licking Valley High School in Newark, Ohio. Beverly is also the advisor for the National Honor Society and the co-sponsor for the Gay-Straight Alliance. Beverly was part of a group of teachers that piloted standards-based grading and helped roll it out schoolwide in 2014. She is currently helping the local middle and elementary schools to develop standards-based grading practices.

**Reach Beverly at [beverly.stuckwisch@kstf.org](mailto:beverly.stuckwisch@kstf.org).**

## How laptops transformed my ideas about what role technology should play in my classroom.

Expectations for technology use in the workforce are steadily rising and, as a result, more and more schools are deciding to invest in one-to-one computing. One-to-one computing involves one device for each student to use in the classroom, most commonly Chromebooks or iPads. Sometimes there are class sets of devices, and sometimes each student is able to take their device home. In my teaching setting, each student receives their own Chromebook, takes it home with them each night, and may even opt to keep the device after graduation.

While there are many affordances to teaching with one-to-one computing, there are also many challenges. At first, I expected to have students use the Chromebooks all the time, that both the students and other teachers would love using them and be excellent at it, and that the students could easily multitask with technology. In the four years that I have been teaching, my ideas of the role technology should have in my classroom have dramatically transformed.

I completed my student teaching in 2013 in an underfunded school district at a school that was in danger of closing. There was only one computer lab—made up of some severely outdated desktops—and it was almost always booked. So, when I landed my first full-time teaching job in a new school and found out they had recently become one-to-one, I was excited for all the opportunities I could present to students. I started making a lot of assumptions about what a one-to-one classroom could look like.

I spent a large portion of that summer remaking most of my assignments to be done on the computer or to incorporate online apps, games, or simulations. After all, the district invested a lot of money into these computers. Surely, I should have students using them to do their work as much as possible. Since my students were millennials, I also assumed they would all love working on the computer and would have as much computer literacy as me (if not more). Additionally, I had always thought of myself as a great multitasker when it came to technology use. Since my students would be digital natives, they would definitely be capable of multitasking as well! I learned in the first couple of weeks that all four of these assumptions were way off base.

Headshot by Andrea Cipriani Mecchi



Though no one at my school had explicitly told me that I had to have students using the computers all the time, I had managed to internalize this assumption. At the beginning of that first year, I tried my hardest to have students use the computers in some way, every day. While there were lots of ways that technology enhanced learning—like online lab simulations, widely available research sources, and opportunities for peer collaboration—there were also tasks that weren't magically enhanced by technology.

In fact, some assignments were made unnecessarily challenging by putting them on the computer. Students couldn't easily show work for math-based problems or draw diagrams of atoms and molecules. Another challenge was that some things were needlessly difficult for me to assess on the computer. For example, if I wanted to get a quick idea of student progress in an exit ticket, it was usually much easier to sort through responses and give feedback quickly if they were on paper. This was especially frustrating when the learning outcome hadn't been enhanced by the addition of technology anyway.

My second incorrect assumption was that students would enjoy working on the computer more than not, no matter what they were doing. In reality, the computers didn't automatically make work exciting. Taking a boring worksheet and putting it in a Google Doc didn't make it any less boring. Many students groaned when I asked them to get their computers out each day. Some insisted my class was often the only period of the day they actually got it out of their bag. I would present assignments online, and students would ask me if they could print them out to complete them. Students especially complained about having to read too much on a screen because it would cause eye strain or they would easily lose their place. These reactions challenged me to think about whether assignments needed to be done on the computer or not.

Knowing that my district had already been one-to-one for a year when I arrived, I figured that all of my students would be fairly computer literate on day one. Growing up surrounded by technology, I really had no idea how difficult the transition would be for both students and teachers who hadn't had as much experience with or access to technology. Many excellent veteran teachers had spent most of that first year being trained—and often spending much of their own free time teaching themselves—how to use

Google Apps for Education. While the teachers and administration had put a ton of work into being trained and training students that year, the fact was that several of the students still needed a lot of assistance. For the incoming freshmen, it was still their first year with the Chromebooks. Additionally, since this was my first experience in a rural district, I hadn't realized how uncommon it was for rural students to have internet at home (or anywhere nearby). Because of this, those students pretty much only interacted with their devices at school. For some of them, their Chromebook was the first computer they had ever used. They were still struggling to learn how to type and how to use Google and I was expecting them to conduct research, write a response, and turn it in—all electronically and all in one period. It was just too much, too fast.

When initially planning for students to work on the computer, I also naively thought they'd have no problem working from multiple tabs at once—reading a primary source in one tab, answering questions on a separate Google Doc, turning their assignment in at a third link. It was yet again unnecessarily confusing and complicated. Not only would students get distracted within an assignment like this, they would also end up opening even more tabs with games and social media. They were much less capable of multitasking than I had predicted, even when the multiple tasks were all related to the same assignment. Students who were still learning how to use the computers were completely lost.

As I realized how wrong my assumptions were, I decided to survey my students so I could get a better idea of how they really felt about technology use in the classroom. Surprisingly, they were quite honest

**Over the past three years, I've taken a step back from using technology so aggressively and instead have focused on how to use technology to enhance student learning or improve efficiency.**

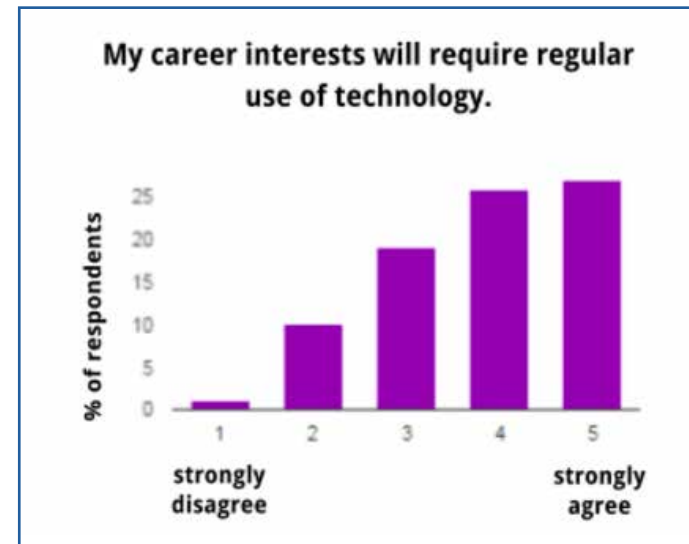


Figure 1: Students agree that technology will be important to future careers.

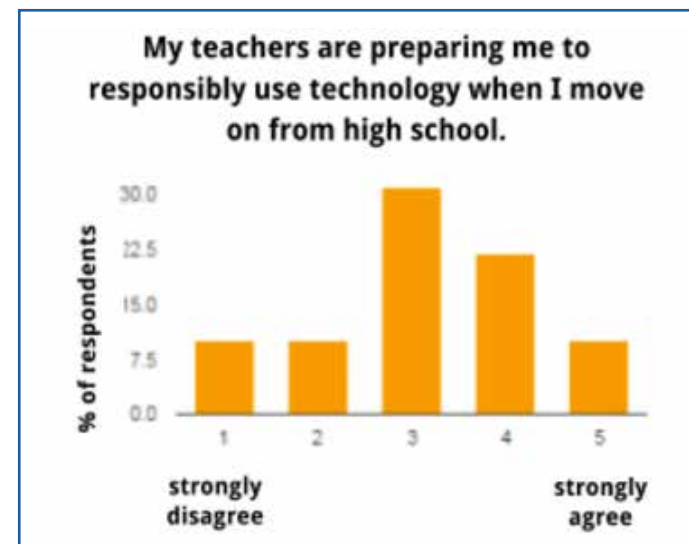


Figure 2: Students don't feel strongly that their teachers are preparing them to responsibly use technology in the future.

and forthcoming. The vast majority of students recognized that they would need to be able to master appropriate technology use for their future careers (Figure 1), yet did not feel strongly that their teachers were properly preparing them for that inevitability (Figure 2). One student recognized ways in which technology could make his work easier, saying, "Reading from a book requires far more time to find the information you need. With a computer, you can

simply type what you need in the search bar and you get all the information that you need." Other students expressed that they didn't particularly enjoy working on the computer, especially when it came to reading, saying things like, "I am less distracted when I read actual books." Students were generally upfront about the computer acting as a distraction to their learning, with 78.4% of students stating that they found themselves distracted by games and social media at least some of the time (Figure 3).

In talking to others in my school, I discovered teachers weren't using the computers all the time every day because they either didn't need to in order to accomplish the goals they set for students or they wanted to spend more time getting comfortable with technology before rolling it out to students. They had much more teaching experience than me and had more quickly realized that the simple addition of a computer didn't automatically trump what they had been successfully doing for years. Many of them were just getting comfortable using computers themselves and rightly wanted to make sure they were masters of a piece of technology before expecting their students to start using it. Teachers who lived in the district understood the lack of internet access and would try to make sure students had time to do tasks that required a connection while they were at school. At the time, students might have thought that using the computers less in these classes meant they weren't being prepared to use technology in the future, but in reality, these teachers were very deliberately trying to avoid many of the frustrations I was facing in my classes. They put student learning first, and added technology when it fit well and when they felt comfortable with it themselves. Usually this meant waiting until they could attend professional development, collaborate with a colleague, or spend time fiddling around with the technology on their own.

Over the past three years, I've taken a step back from using technology so aggressively and instead have focused on how to use technology to enhance student learning or improve efficiency. Instead of thinking of the Chromebook as the answer to everything, I think of it as one possible tool to use for learning. It's convenient to have students pull their Chromebooks out to play with online simulations when lab materials aren't available or to visualize things they cannot see like atoms and molecules. I also definitely have students write more in science than I would without

# PROFESSIONAL DEVELOPMENT: VISITING OTHER TEACHERS

BY KAITIE O'BRYAN

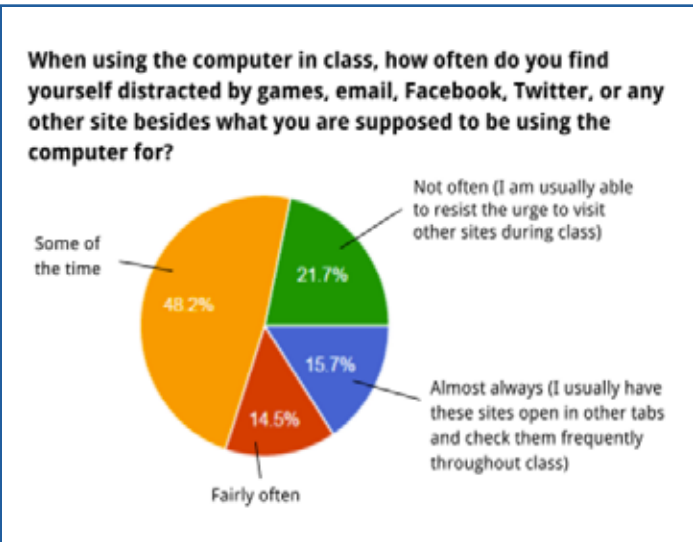


Figure 3: The vast majority of students find the computer to be a distraction at least some of the time.

and appear as though they're working. Instead, I need to encourage students to try to juggle all of this technology responsibly. Allowing students to try to balance these things and then addressing significant problems when they arise is the best way to help them develop good habits with technology.

I'm convinced one-to-one computing is the wave of the future for our classrooms. But I also think it's important for educators to understand when students will actually benefit from computer use. With specific technology standards now in the Common Core and many state standards, it is easy for teachers to feel pressured to use as much technology as possible. I propose that educators ask themselves a couple of key questions before integrating a new app, website, game, or other piece of technology into their lesson (Figure 4). Will student learning be enhanced by the use of this technology? Will this technology reduce time spent on logistical things like grading? If the answer to both of these questions is no, it's okay to stay low-tech for the day!

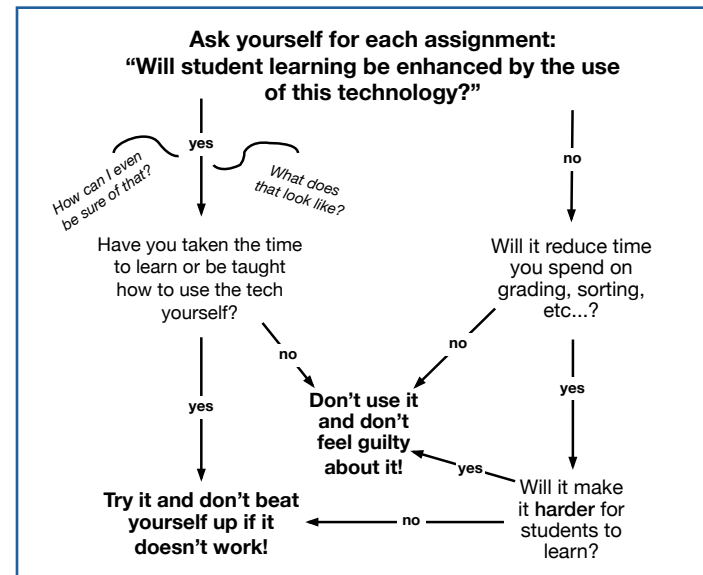


Figure 4: How to determine whether to add technology to a lesson.

## CITATION

Stuckwisch, B. (2017). An honest look at a one-to-one classroom. *Kaleidoscope: Educator Voices and Perspectives*, 3(2), 12–15.



**Kaitie O'Bryan**, a 2012 Knowles Teaching Fellow, teaches math and computer science at Mounds View High School near Minneapolis, Minnesota. She is currently in her fourth year of teaching and is focused on building strong cultures in her classroom, creating collaborative problem solvers, and providing students with opportunities to create in class. **Reach Kaitie at [kaitie.obryan@kstf.org](mailto:kaitie.obryan@kstf.org).**

**I visited two Knowles Teaching Fellows at a school that uses problem-based learning.**

**Quick info:** I visited a school using a strategy I wanted to implement with Linda Abrams (KSTF Program Officer, Teacher Development) and another 2012 Teaching Fellow. We met ahead of time by videoconferencing to determine the activities in which we would participate (e.g., coaching meetings, observing classes, leadership meetings, etc.). We were constantly debriefing during our time at the school.  
**Who should consider this PD?** All classroom teachers  
**Duration:** One day  
**Cost:** \$300 (hotel and meal cost) + travel

At the beginning of this school year, I found myself with another new prep: Concepts of Advanced Algebra. Having a new prep for a teacher can sometimes mean a year of constantly feeling behind without a "baseline" from which to start. Creating homework assignments, assessments, anticipating and responding to student struggles that you haven't seen before—it can be exciting, but it can also be exhausting. For me, I was excited about having a course in which I could try centering my classroom around carefully scaffolded and rich discussion-worthy problems. This variation of Problem-Based Learning (PBL) moves away from direct instruction and encourages students to author their own mathematics with help from one another. Phillips Exeter Academy has an entire curriculum focused on such problem sets and utilizes what they call a "Harkness method" in each classroom, where groups of up to 12 students sit around a round table to share ideas and strategies for solving these problems.

I had attended the Exeter math conference the summer of 2015 and was excited about the idea of implementing it in my classroom. Particularly motivating was a "Conference Within A Conference" session I attended called "Harkness for Thirty" by Jonathon Sauer. Teaching Concepts of Advanced Algebra would allow me to experiment with some of these methods in my classroom. I was

Headshot by Andrea Cipriani Mecchi





Photo by Genaro Vavuris

While at Arete, Lindsay McDowell (2012 Fellow), Linda Abrams and I sat in on a leadership team meeting and observed Mary and Ian's math classrooms, as well as a social studies class. Each of these experiences gave us a different lens to view how a problem-based curriculum was implemented in the school.

From seeing the students and classes in action, I saw how conversations and discussions were at the heart of many students' classes. In the "great lessons" class I observed, students led the discussion around Dante's *Inferno*. Even in staff meetings, it was clear that discussion was valued over other learning or delivery styles. This helped me realize that students are not blank slates when they walk into my class—they have had varying experiences with discussion in prior classes. I needed to know more about their experiences in other content areas around discussions to better understand what discussion skills students brought into my classroom. In addition, I needed to make my expectations for discussion in math more clear. I needed help to build a picture of what a productive discussion includes.

Watching Mary and Ian teach also helped me see how this style of teaching looks in the "real world" and see beyond the theory. Before implementing PBL in my classroom, I had several concerns about whether I would be able to do this with my students. Homework completion was non-existent, and some students were prone to distraction. In theory, I thought Harkness would only work if students did their homework each night and if they had the ability to stay on task for 55 minutes at a time. When seeing Mary and Ian's classroom in action, I saw that was not the case. Talking to Mary and Ian, they mentioned that not every student does their homework each night and, like most classrooms, there would be a student or two off task while working in groups. It was encouraging to know that these were things that many teachers struggled with but that did not prevent teachers from having high expectations for their students inside the classroom. Each teacher had different strategies to keep student engagement strong in class. As I watched Mary and Ian teach, I was able to see how their decisions in the classroom helped keep student work productive. For example, while I was there, Mary "froze" the class to capture their attention mid-problem. This technique required students to focus their attention on Mary or

another student, clarify a common misconception, and then return to their small group to continue working. These small but significant decisions helped me develop strategies for encouraging productive work in class.

When I returned to my school, I made a few changes to how I implemented problem-based learning in my classroom:

- **I was more intentional about building up participation and collaboration skills.** After witnessing how omnipresent discussion was at Arete, I knew I needed to do some norming specifically around discussion for my class. Using some resources Dr. Sauer shared with me, my class read an article about the philosophy behind problem-based learning and talked about what the classroom should look and sound like. From there, I focused on one aspect of what I should see/hear in class and told students I would be taking notes when they were participating in one of the productive ways we discussed. This became a type of "hybrid participation quiz."
- **I broke up class time.** I planned out at what points during the problems I anticipated students needing additional clarification, or points where I really needed all students to be on the same page for during the lesson. When it was clear that students were at those points in the lesson, I would implement the "freeze" strategy I saw in Mary's classroom to get their attention, re-direct or clarify and then allow students to keep working.
- **I made space and structures to encourage students to take notes on their learning.** When talking to students at Arete, I noticed many annotated their notes in and out of class—a practice that I modeled for students but did not explicitly expect from students. I realized from my observations that I wanted to provide more opportunities for students to reflect through taking notes. Rick Barlow, a 2013 Teaching Fellow, had talked about grading student-self-corrections to homework at the 2016 KSTF Summer Meeting, and this seemed like a great way to integrate reflection into my classroom. When I returned to my school, I purchased 25 green pens that were special "reflection pens." Each hour, I had students return to their seats for the last 10 to 15 minutes to debrief as a class. This was time for them to grab a green pen and write

down notes next to each problem we discussed. I modeled this with my own green marker on the whiteboards around the room as well and provided prompts for students to write their own reflections at certain places. It was these reflections on their problems that were graded each day.

From going to Arete, I re-realized that learning happens in a context. "Context" covers a variety of aspects of our educational communities, but in this case, I saw how one strategy in theory looks in the context of a classroom. I have long been enamored with problem-based learning and could envision doing it in my classroom, but the actual implementation in my context was rough. Going to Arete Academy showed me how the teachers and community created a context that allowed problem-based learning to be effective. Equally as encouraging was knowing that my students and I could create a context that would make the strategy effective for us as well.

I truly consider teaching an art form: instead of clay, oil paint, or charcoal, teachers work with complex instruction, project-based learning, or engineering design. Furthermore, just like artists visit galleries and share studio spaces to push their thinking about their work, teachers also benefit from similar collaborations. Even within my own school, I have observed Spanish teachers to see how they engage students and break down that "fear" barrier students can bring into the classroom. Speaking with English teachers has challenged me to think more deeply about the types of contributions students can make in classroom discussions. While I took a day off from school and traveled to see these teachers at Arete, there are fantastic "artists" in each building from which teachers can learn. My own challenge is to find these teachers closer to my classroom in Minnesota, see these teachers work in their context, and understand how these strategies and philosophies can be adapted in my classroom.

#### CITATION

O'Bryan, K. (2017). Professional development: Visiting other teachers. *Kaleidoscope: Educator Voices and Perspectives*, 3(2), 16–18.



# TEACHERS' LOUNGE: TEACH AWAY YOUR STUDENT LOANS

BY KATIE WADDLE



**Katie Waddle**, a Knowles Senior Fellow and associate editor

for *Kaleidoscope*, teaches 9th and 10th grade algebra and geometry at San Francisco International High School in San Francisco, California. She can be a little detail-oriented and, as a born and raised Midwesterner, still struggles with being firm on the phone.

Reach Katie at [katie.waddle@kstf.org](mailto:katie.waddle@kstf.org).

## Find out how to navigate loan forgiveness programs for teachers.

When I started teaching, I had student loans from both my undergraduate and graduate degrees. I had multiple subsidized federal Stafford and Perkins loans from both institutions, a federal Teacher Education Assistance for College and Higher Education (TEACH) grant, and an institutional loan from my graduate program. I had also qualified for the Assumption Program of Loans for Education (APLE), a California-specific program.

Banks know that they can make a lot of money off of student loans (in a lousy economy many people fall behind on payments), so they are a valuable asset to buy and sell, and as a result I had multiple lenders servicing my Stafford loans. To deal with all these parties, I was completing no less than seven different sets of paperwork at any given time. And yet I never paid a single penny of the roughly \$60,000 I owed. (And I'm not in jail.)

I want to make sure to point out that the system is not fair. Math and science teachers (and some other shortage areas like special education) are eligible for Perkins loan cancellation and higher levels of Stafford loan forgiveness; my friends who teach English and history are either not eligible at all or not eligible for as much money. Your benefits might vary based on the institution you attended or the state you live in. I received a special institutionally-based loan, and qualified for a California-based loan forgiveness program for educators. Your credential program or state might not have those benefits. I teach at a low-income school, and your school might not be on the list qualifying you for some programs. Also working in my favor was that my parents and grandparents were able to pay for some of my college tuition, and I received tuition support from another fellowship, so I didn't have loans above the limits of the forgiveness programs (more about that limit below). Many people graduate with more debt than I did and will probably have to get creative. One day teachers will be fully recognized for the great service they provide society, but we're not there yet.

This article will give you information about subsidized and unsubsidized direct loans, subsidized and unsubsidized federal Stafford loans, Perkins loans, and TEACH grants specifically. I am not an expert, a financial advisor, or a wizard—I'm just a regular teacher like you. Official websites out there can summarize all the necessary information for you (see below). If your situation is at all complicated



Photo by Andrea Cipriani Mecchi

(e.g., you have gaps in your teaching time, you started teaching before 2004, etc.), I encourage you to go to those websites and/or call your lender.

### How do I know what loans I even have?

To start with, you need to get organized. When I finished my master's degree, I was not even clear on what loans I had or what company was servicing them. My loans kept getting bought and sold, and I wasn't paying attention.

Luckily, there's a website for that. The National Student Loan Data System (NSLDS) has a record of every loan you got and where it is now (see Resources). If you have a loan that is special to the

school you attended, like I did, it will not be on that list. But all direct, Stafford, and Perkins loans will show up there.

I made a big spreadsheet with all my loans to keep track of all the information, and I cross-referenced it to the NSLDS page (see Figure 1). That way I could keep track of all the various ID numbers, logins, people I'd talked to, email addresses, account numbers, and of course, my progress in making everything disappear. This proved invaluable because I needed to keep track of these things for five years.

### What am I eligible for?

The next thing to figure out is your eligibility. Each type of loan has different requirements. Are you a math or science teacher? Is your school on the list of low-income schools? It's NOT only Title I schools. For a math or science teacher teaching at a low-income school, you get a max total of \$17,500 worth of direct and Stafford loans (subsidized or unsubsidized). If you have more than that, you will have to start paying the rest, but you should NOT make payments on that \$17,500. I am not going to create any problems by trying to summarize all the particulars here; you'll have to do some close reading on the applicable websites.

### Do I just not pay?

You can't just stop paying, though: you have to get your loan servicer the memo that you are teaching. Your account needs to be "in forbearance," meaning

NSLDS#	Type of loan	amount	school	loan date	who is servicing	current state	to do	acct #	contact info /address/phone/email/website
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									

Figure 1: Sample loan spreadsheet

you are not making payments in anticipation of forgiveness or cancellation in the future. You need to complete this paperwork close to the time of the start of the school year, and you need your principal's signature on a letter certifying that you are teaching at the school. Consider getting those signatures before you leave in the spring if your principal is planning a summer break trip to Thailand. The Teacher Loan Forgiveness and Forbearance Application (TLFF) is universal; unfortunately, the Perkins form seems to vary by institutional loan servicers.

You will complete this form every year, and you have to follow up and make sure they received it, they processed it correctly, they applied it, and your account was put into forbearance. Pay attention to dates: it takes them longer than you'd think to process these one page applications, and you may have to ask them to put the account into forbearance while they wait to approve your forbearance (sigh, I know). I encourage you to be pushy.

#### **A Word About Loan Servicers**

I'm sure that there is a loan servicer out there that really believes in loan forgiveness programs for teachers. My loan servicers, while they did not come right out and say this, seemed to have a more oppositional institutional philosophy. This meant that every single step I took along the way was met with questioning to the point of absurdity.

An illustrative example: The TLFF states that if the low-income school directory is not updated, the previous year's list may be used. In my fourth year of teaching, my forbearance request was turned down because my school was not on the list—despite the fact that I had been teaching at the same school the year before and they had approved my paperwork the year before. I searched for schools in California, and found that in fact no schools from California were on the list. The list of low-income schools in California simply had not been issued yet.

The people I spoke with on the phone at my loan servicer were completely unsympathetic. When asked, "So you're not approving requests from any teachers in California?" I was told that they were not able to comment on anyone else's application. I had to contact the California Department of Education and finally after agreeing to print out and send in the page from the year before (from the low-income

school directory that is freely available online and that they themselves use to check eligibility), my request was approved.

In the meantime, I think I made upwards of 20–25 phone calls, emails, and complaints on websites. It might come from working so much with teenagers, who see the world in a more black-and-white way, but I think I possess more than the usual quantity of righteous indignation. I was working hard for my money, I followed all the rules, and I wanted to keep what was mine.

I encourage you to document the dates you make phone calls. You will never speak to the same person twice, so make sure you have your facts right. I asked to speak to supervisors frequently, and then to their supervisor, if necessary. I became a stronger person. You can, too.

#### **Think You're Finished?**

Towards the end of your five years (or each year if we are talking about Perkins), you apply for "loan forgiveness" (or "cancellation" if we are talking about Perkins). I found this term objectionable because I had done nothing wrong. But so it goes.

This paperwork is even more fun, because you have to get signatures from the principals at every school you taught at in those five years. Not the principal you had, the current principal. For me, this meant introducing myself to someone who had never met me and asking her to sign paperwork saying that I worked at the school five years ago, even though she herself had no actual proof of this fact. (It also meant mailing paperwork to Boston to my own former

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***The fact that there are government programs out there to help you with your student loans indicates that teaching as a profession is valued. You are being further compensated (beyond your measly piddling salary) for providing a public service.***

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principal before I found out they needed the current principal's signature). But you know, if the federal government needs that, who am I to question it?

I encourage you to be extremely careful with this paperwork. You will still have to submit it five times (or more!), but hopefully it will eventually get approved. You have to get Perkins paperwork for cancellation from your institution.

#### **So You Got Yourself a TEACH Grant**

My graduate school colleagues and I found the TEACH Grant to be the most inscrutable of all the loans. While I did not fall in this trap, I had friends who had their TEACH Grants converted to direct loans for the most bizarre reasons. My favorite is a friend who had their signed paperwork returned, the signature circled, with a note that said "no signature." My understanding is that a different company is servicing the TEACH Grant now, and so I hope these problems no longer exist.

#### **What else is there?**

Ask around at your school or the institution where you got your master's degree if there are state-specific or institution-specific programs. I took advantage of California-based APLE, which I came to imagine as an office somewhere in Sacramento where one person sat all day under a pile of 3,000 manila folders. They processed things years after you submitted them. I didn't know I had been accepted into the program until at least a year after I applied. They were hilarious to talk to on the phone. And then they periodically at totally random times of year sent checks to my loan company, no questions asked. It looks like the program may be over, although the website seems to be at least three years out of date now. Maybe your state has something like that?

#### **Final Thoughts**

I hope that you leave this article thinking, "Man, this is going to be a little tricky!" and also, "I really need to get my ducks in a row," but at the same time, "I think I know where to start," and "I'm sure glad all these programs exist." I emphasized the things that will be difficult about this process because I didn't want you to face them alone, but also because I know you can handle them. You make worksheets for a living; I think you can handle doing a couple yourself.

The fact that there are government programs out there to help you with your student loans indicates that teaching as a profession is valued. You are being further compensated (beyond your measly piddling salary) for providing a public service. I went to a fancy private college and a fancy private graduate school, I graduated with \$60,000 of debt, but I am 30 years old, and I am completely debt-free. These programs will not persist if we don't get out there and talk about their impact on us. This is for you, but it's also bigger than you. It's worth fighting for.

#### **RESOURCES**

National Student Loan Data System (NSLDS) - <https://www.nsls.ed.gov/npas/index.htm>

Sample loan spreadsheet template - <http://ow.ly/7dd130bmWvvy>

Federal Perkins Loan Cancellation and Discharge Summary Chart - <http://ow.ly/6eYs30bmWWw>

Teacher Loan Forgiveness Forbearance Request (Direct and Stafford) - <http://ow.ly/sU0j30bmXcX>

Teacher Loan Forgiveness Application - <http://ow.ly/MhKd30bO2Tf>

TEACH Grants - <http://ow.ly/DgXI30bmXKp>

Assumption Program of Loans for Education (APLE) - <http://www.csac.ca.gov/doc.asp?id=111>

#### **CITATION**

Waddle, K. (2017). Teachers' lounge: Teach away your student loans. *Kaleidoscope: Educator Voices and Perspectives*, 3(2), 19–22.

## **ABOUT KSTF**

The Knowles Science Teaching Foundation (KSTF) was established by Janet H. and C. Harry Knowles in 1999 to increase the number of high quality high school science and mathematics teachers and ultimately, improve math and science education in the United States. The Knowles Teaching Fellows Program, the Foundation's signature program, awards five-year Fellowships to promising early-career, secondary science and mathematics teachers, and supports them in their efforts to improve education in their own classrooms and beyond. The KSTF community includes more than 300 Fellows who taught science, math and related subjects to over 25,000 high school students during the 2016–2017 academic year. For more information, visit [www.kstf.org](http://www.kstf.org).

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1000 North Church Street • Moorestown, NJ 08057

856.608.0001 • [www.kstf.org](http://www.kstf.org) • [info@kstf.org](mailto:info@kstf.org)