FACULTY NEWSLETTER

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Au Revoir

Innovation in Our Schools

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From the Editor

by Sandee Mirell

Recently, I heard a comment about the Newsletter suggesting that our readership might not be as broad as we want it to be. I hope it's not true, and if you've stumbled on to it for the first time, I encourage you to go to http://www.caisca.org/page/22434_Archived_Publications.asp and check out a few back issues. The quality of the writing and the information are worth the time spent. Another value I hope has accrued is setting up connections between teachers and schools that are embarked on similar explorations.

I am sad to say that this is the last issue of the newsletter that I will be editing because I am leaving CAIS in June. An additional teacher-focused newsletter that might be of interest to you going forward is *Independent Teacher*. It is now available on the NAIS website and in its tenth year of publication, http://www.nais.org/Articles/Pages/IndependentTeacher.aspx

A number of CAIS teachers have contributed articles to it, some of which we have re-published in our newsletter.

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Taking Science Classes to the Edge of Space
with High Altitude Weather Balloons

by Matt Shargel
Middle School Science
The Seven Hills School
mshargel@sevenhillsschool.org

Class Teamwork

High altitude weather balloon flights offer a unique opportunity for students to experience and conduct experiments in a challenging and exciting edge-of-space environment! The balloons can be designed to carry a wide array of student-designed experiments to altitudes of around 100,000 feet, where atmospheric pressure drops dramatically, wind-speeds can top 100 mph, solar radiation is extremely intense, and temperatures exhibit unexpected drops and increases. Digital cameras can be used to record truly amazing images of the Earth's curve, cloud patterns from a satellite's perspective, and the darkness of space above.

While there are many technical challenges in designing, launching, and recovering these devices, the skills necessary for implementing such a program are within the range of those found in our students at The Seven Hills School. The challenge of the design process, experimental planning, excitement of the launch and chase, thrill of recovery, and amazement in observing the experiment results, photos, and video are all benefits of such a program.

One recent experiment flown included a student-designed device for sampling microbes from altitudes above 80,000 feet!

Major Equipment

- Balloon - 5-20 foot diameter latex ($50-100 each)
- Helium - Enough for 1 launch (~$120)
- Parachute - 5 foot diameter reinforced ($50 each)
- Experiment Packages 12 max per launch - ($5 each)
- Radio Tracking Systems – we use 2 redundant systems ($200-300 each)

Program Outline-Grade 8

Program Introduction - 3 Class Periods

Design and Construction - 5 Class Periods
Tethered Test Launch - Half a Day On Campus
Launch - 1 Full Day

Launch day students would be a part of 1 of 3 teams.

Team 1
A launch team readies the vehicle, activates sensors, cameras, and beacons, fills and launches the balloon from the field.

Team 2
A tracking team receives data from the balloon at school. They process the data, comparing real-time coordinates with the predicted flight path and processing this numeric data into directions that can be mapped. They communicate to the launch and recovery teams via internet video links.

Team 3
A recovery team stages near the predicted landing site. A typical balloon flight path in our area, northern California, is 40-80 miles. They receive updated flight information from the tracking team and adjust their position accordingly. They navigate to the balloons' landing location, recover the vehicle, and transport it back to the school for further data, photo, and video uploading.

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A successful launch and recovery is also a unique and newsworthy event in a community. Many opportunities exist for positive media coverage of such events. Connections can even be made throughout the school and across grade levels as nearly a dozen experiment packages can be launched at one time. Strong cross-discipline curriculum could be developed between science, math, and public speaking for this activity as well. The flight data collected from a launch could include measurements of temperature, altitude, solar radiation, ascent and descent rates, ground speed, and humidity. One recent experiment flown even included a student-designed device for sampling microbes from altitudes above 80,000 feet!

There are many details for anyone to understand before undertaking a launch, but there are fellow teachers, enthusiasts, and online resources available to those who wish to bring a high altitude balloon launch to their own classroom.

Our Weather Balloon

The Mind Body Program

An Interdisciplinary Approach to Physical Education & Athletics

by Patti Syvertson
Director, Mind Body Program
Crystal Springs Uplands School
psyvertson@csus.org

The goal of the Mind Body Program is to empower Crystal Springs Uplands School students with the knowledge that enables them to make healthy informed choices for lifelong fitness and wellness. The realization of the program includes a technology-based integration of athletics, physical education, health, science and interdisciplinary projects. In addition to the activity portion of our Mind Body program, our curriculum includes a Fitness Lab rotation that enhances student learning by following a progression from ninth through eleventh grade; these labs build upon the fundamental components of fitness and ultimately advance to student development of Individual Fitness Plans.

How did Crystal Springs Uplands School, a private high school in Northern California, end up with a state of the art physical education program? It has been a long, circuitous path. Historically, our physical education classes were similar to programs across the nation; we taught team sports with attendance, dress, and participation playing a role in our grading rubric.

We knew we wanted to go in an entirely different direction, but we lacked the expertise to help us fulfill our vision. In 2001, we applied for and received an E.E. Ford grant that enabled us to add a new position: Fitness Director. Once our director came on board, we sought a new curriculum whose goal was to promote a symbiotic relationship between a healthy mind and a healthy body.

We made technology [...] an integral part of our new program

We researched programs across the country such as the "New PE" (http://www.edutopia.org/new-pe-curriculum) that had been successfully integrated at Naperville High School, and the department faculty studied the latest research on brain chemistry, health and exercise. The curricular development began that summer, when the administration provided the time and the resources for our department's teachers, counselor, and directors to collaborate with the science department and administrators.

This four-day brainstorming session changed the direction of physical education at Crystal Springs. At this point, we aligned our department with the school's mission of graduating 21st century learners. Interdisciplinary projects were created and implemented, and activity classes experienced significant changes when we introduced lifelong activities, which allowed our instructors to teach to their strengths. Most importantly, we launched an educational component: the Fitness Lab. The Mind Body Program was realized. (continued p.12)

ADVENTURE IS FOR THE ADVENTUROUS

A 21st century sport that integrates technology, P.E., science, history, art, the Maker Movement and helps cure the "nature-deficiency" disorder.

by Christine Eaves
Instructional Technology Coordinator
Laurence School
christine@laurenceschool.com

When I tell my colleagues and friends that I can't stay out late on a Friday night because I have to be up at 5am on Saturday to go on a hike, they look at me like I'm crazy. "In this heat?" they inquire. I tell them, "I'm going geocaching...we start early because we'll be on the trail until late afternoon." Heads cocked, they trepidatiously ask "What's geocaching?" For the millionth time, I try to explain it with enthusiasm. I'm met with continued confusion. Perplexed pauses. Assuming there is a valuable gain waiting in a tin can behind a tree in the woods, they inquire, "Do you get stuff? Like a prize in the geo-whatever? Money?" I say, "Uh, nope. Just the profound satisfaction of finding what I was looking for, really." They don't know what to say. It's not for everyone. But for the adventurer, the explorer, the grown-up who forgot how much they craved a scavenger hunt when they were a kid, the person who loves the outdoors and doesn't get enough....this is for them. I haven't really come across a child yet who didn't love it. Or, at very least, like it. As my hero, Everett Ruess wrote at a very young age in the early 1900's, "Adventure is for the adventurous." And so it is.

Rubbing the sleep from my eyes, I put on clothes I will later drench with sweat from my elevation climb, grab my pack and hiking pole and start the day. My GPS is pre-loaded with the geocaches I intend to find, I've studied the maps of the island we'll be exploring and I've got my hiking shoes on. Food, first-aid supplies and loads of water ride in my pack to get me through a long day. My buddy honks his horn outside my house before the sun is up and we are off to meet the rest of our crew, this time at the Ventura Harbor to take a boat to the uninhabited Santa Cruz Island. Soon, we'll arrive, shaky legged and hopefully free from sea-sickness to start our adventure. There are almost no actual geocaches on this island.... only virtuals....Earth Caches and Puzzle Caches, but we don't care. A find is a find. A search is a search. And a hike, whether we find what we're looking for or not, is always a hike worth taking.
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So, what is geocaching?

Geocaching began in 2000 when satellite technology improved and became available to the general public. Suddenly, anyone with a GPS device could pinpoint their exact location on the planet. The very first geocache was hidden in Oregon that year and coordinates were placed on a public website. People started searching it out and finding the cache immediately. The sport of Geocaching was born! Members of the geocaching community hide geocaches, which are containers ranging in size from a magnetic micro smaller in diameter than a dime, to an ammo box full of tradable items that kids (and adults) love to find, then submit the coordinates to http://www.geocaching.com/ who, after approving that the hide meets necessary criteria (hidden no closer than a tenth of a mile from the next geocache, isn't on private property, etc.), publishes it for other geocachers to search out and find.

Science with Humanity

A new senior honors science course asks students to consider Bioethics as they learn new technology

by Lisa Catterall
HS Science Instructor
Mount Madonna School

Last year, I was in the middle of taking a small group of seniors though the College Board AP Biology curriculum. One day, our Biotechnology unit turned into a discussion of Monsanto's lawsuit against a canola farmer in Canada. The farmer used his own heirloom seeds, but pollen from the farm next-door containing Monsanto's patented round-up-ready genetic technology blew into his field. Monsanto lawyers successfully put him out of business, claiming he stole their technology. The students were horrified by this case. They wanted to discuss the philosophy behind the event, and the ethics of genetics. In short, they became fascinated by Bioethics.

For years I have wondered how humankind would manage to marry powerful advances in the manipulation of genes with a paucity of funding for the study of universal values and ethics. I believe this generation of students will need a deep understanding of these issues to be able to cast a confident vote on local issues. In our state, GMO labeling has been on the ballot. Is the slice of information included in AP Biology enough to create an educated citizen in the area of genetics? What about the students who only take lower-level courses in biology?

Our school has been wrestling with ways to address engagement during the senior year. The AP program has not seemed particularly relevant to the population we serve as an independent school; it was created as an access program for advanced students to complete a year or semester of college for free in high school. Typically, our students have no need to finish college in a short time and we strongly encourage them to take courses like Biology in college anyways, even if they pass the AP exam.

These considerations, and a recent visit to the Gandhi memorial in India, prompted me to design a new kind of senior science course, now approved by the UC system as an Honors senior-level science class with college-preparatory Biology, Chemistry, and Physics as prerequisites. On the same trip to India, we spoke with the Dalai Lama. His holiness stressed that as people worldwide turn away from organized religion (the statistics on this are staggering) every day, it will be up to educators to find a way to bring ethics and universal human values into the traditional curriculum. This idea seemed revolutionary, but in truth, it is already in practice at MMS in the Social Sciences program.

Mahatma Gandhi named seven social sins; the sixth was practicing "Science Without Humanity." When I saw this carved in stone at Gandhi's memorial in Delhi, it resonated as exactly what we are experiencing in some areas of Biotechnology in the U.S. My own background as a researcher at Genentech taught me the power of genetic tools as well as the potential value for mankind. How could I get students ready to face a world where we can manipulate living material as we can, and where students can perform genetic transformations in the lab by the time they are 16?

I felt that not allowing the students in my class time to explore this issue would be, in effect, denying their place in history.

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The farmer used his own heirloom seeds, but pollen from the farm next-door containing Monsanto's patented round-up-ready genetic technology blew into his field.

DYNAMIC DISCUSSIONS
from a class blog

A class blog that began as a literary discussion site about women's literature turns into a forum where students can "find and explore" their own ideas and resources on gender issues.

by Crystal M. Land
Teacher, Assistant Head and Academic Dean
Head Royce School
sland@headroyce.com

It's Wednesday evening around 8 p.m. and I'm beginning to wonder if the assigned students will meet their deadline to post for our class blog (www.landwomenslit.blogspot.com). I have no control over what they post—it can be anything related to our broader topic of gender in the 21st century, including newspaper or magazine articles, YouTube videos, clips from old episodes of "The West Wing," or the latest in pop culture—and the content is often surprising. The only requirement: designated students must post something of interest related to gender each week, and then class members post a response to at least one of the items.

As I click on the class blog, I see the posts roll in. I laugh and am intrigued. If it had been me, I would have posted an article from The New York Times or perhaps the International Herald Tribune's excellent site, "The Female Factor." But they are 17, and I am 51, so their interests are quite different—and absolutely fascinating. Mitchell posts ads from the 1950s on the joys of being a housewife and a love of appliances. Mya posts links and articles about Robin Thicke's recent music video, "Blurred Lines." Thomas posts an article on a lesbian candidate in the New York City mayoral race, and Kim posts an animated cartoon about the Powerpuff Girls and gender roles.

> [...] I observe how effectively this type of student-driven content unites the class community and develops individual student thinking. And I've learned more than I ever expected on current gender topics.

Student response to the various blog posts is varied: some posts garner a lot of excitement, others a few cursory responses, but when class begins on Wednesday, students are always ready to talk about them. So, each week I devote part of the time to discussing select posts and give up some traditional academic discussion in exchange. The trade-off is worth it: I observe how effectively this type of student-driven content unites the class community and develops individual student thinking. And I've learned more than I ever expected on current gender topics.

I originally started using a class blog as a way to extend a discussion about literature. By posting a discussion question on the blog, I invited students to respond not only to me but also to one another. With this format, the blog allowed students to plan out their answers and build on classmates' comments. One student, Surya, noted: "In class, you don't have as much time to carefully plan out what you are going to say. That's good in many ways, and one of the best parts of a discussion-based class."

Kim added: "As a student who has a harder time formulating arguments and ideas on the spot, I have been able to use the blog as a safe space to share my thoughts with the class, without the pressure of 20 eyes watching me. I feel like I get more time to think and respond to my classmates, unlike in class, where I often miss the opportunity to participate because the conversation has shifted."

Still, the way I initially created the blog was just an extension of the regular classroom discussions on literary texts. After years of reading the research on the benefit of student-centered learning, I decided to adapt its use to one that fully embraces a student-centered, emergent curriculum, and encourage students to bring their interests to the table. (continued p. 14)

Using Technology to Escape Educational Silos

News flash - Rapunzel Escapes Tower by Tweeting

by Joshua M. Sneideman
jsneideman@gmail.com

What is an educational silo? I have always understood it to mean the isolated teacher in a wheat field of students who never has time, nor opportunity to have meaningful collaboration with colleagues. Sometimes teachers place themselves in the silo, but more commonly it is the result of institutional cloistering where meetings are mundane and leaders lack an emphasis on professional growth.

How do we grow professionally if we are the educational equivalent of Rapunzel stuck in a tower albeit doing great things from our high and solitary place? Ponder this, how might the story of Rapunzel be different if she had Wi-Fi an RSS feed and Twitter? Or to ask the same question more directly. How can teachers grow professionally from the use of technology? Maybe you are happy in your silo, if so stop reading after the next sentence. Have you secretly wondered why so many people talk so much about Twitter? If the answer is yes, then you need to keep reading. Can using Twitter help you grow professionally, and increase your digital footprint? Yes. Can RSS feeds help you save time and develop more insight into your craft? Yes. These were just some of the topics that were discussed at the Not-For-Tech-Directors Technology Professional Development Day I hosted for CAIS last spring.

How might the story of Rapunzel be different if she had Wi-Fi, an RSS feed, and Twitter?

To answer the question "how can technology help you grow," I say look no farther than the Twitterverse. Yes, Twitter. Twitter can be an amazing tool for professional growth. How you ask? The secret lies in the proper use of hash tags (#keyword). Here are some resources to get you started; the best educational hash tags or 50 best educational hash tags. You have the opportunity to bounce ideas off of the whole wide Twitterverse, I mean world?

Twitter chats; enable educators to communicate around specific issues. These Twitter chats connect interested parties to meet at pre-assigned times to discuss topics. There are also Twitter book clubs for California educators. If you want to discuss your favorite author, say Daniel Pink, then check out who is discussing his newest book in the #CAEdChat Summer Book Clubs or create your own book chat.

Imagine planning a unit with three teachers from geographically distinct areas and/or socio-economically distinct settings and then having all your students simultaneously read a certain book while communicating their reactions and answers to questions on a Twitter chat group! What 21st century skills do they model? You guessed it, a whole lot of them, too many to put in this one article. (continued p. 15)

From the Editor (cont.)

In fact, Crystal Land's article on her classroom blog appeared first in Independent Teacher.

The last few newsletters have been focused on 21st century learning, and this issue is no exception. Josh Sneideman who served last year on the Southern Professional Services Committee writes about Twitter and RSS as valuable sources of online professional development for teachers – an increasingly robust source of professional development in the 21st century. Patti Syvertson from Crystal Springs Uplands shares the process the P.E. department went through in changing focus to include lifelong fitness – a 21st century development in a number of CAIS schools.

Ethics and other "non-cognitive" skills are thought by many to be as important as academic skills in the 21st century. Lisa Catterall tells the story of how a science lesson story led to a robust focus on bio-ethics.

Matt Shargel's middle school students knock on the border between Earth and space in sending weather balloons to above 80,000 feet, or 15 miles, above Earth. He tells you how. Crystal Land takes a risk in allowing her women's literature class blog to be student-generated. She moderates, but does not edit. The 21st century is creating a whole new understanding of student-centered learning.

Finally, technology teacher, Christine Eaves, from the Laurence School, explains a new 21st century sport combining not only technology and P.E. but science, history and art as well. Integration achieved! It's even involved in the Maker Movement.

It has been such a pleasure editing the CAIS Faculty Newsletter. Thank you to all whose articles have appeared in these pages. As for me, I am planning to be available to present and consult on teacher professional development. After June, I will be available at mirell.sandee@yahoo.com. All the best to you, and thanks again.

-Sandee

Weather Balloons (cont.)

Frequently Asked Questions

How do you find where the balloon lands?

Balloons are commonly tracked with an APRS (Automatic Packet Reporting System) that works through HAM radio channels and signal repeaters. This system allows the vehicle to transmit its coordinates throughout the entire flight. These can then be retrieved and converted into latitude and longitude readings that can be mapped. An APRS system requires a HAM operator's license. We have an enthusiastic and generous school family who has sponsored and directly supervised the equipment and use of their call sign for our launches. We also use a commercial tracking device called a SPOT. This can be set to give a position report every 10-minutes. While it does not work above about 30,000 feet, it can be very useful in finding a payload that lands in an area without clear HAM radio communications. Landings can also be roughly predicted using online software that uses real-time wind and weather patterns in the flight area.

What are the regulations for weather balloon flights?

Weather balloon flights are governed by the FAA. In our area we have made courtesy calls to our local airport control tower several weeks before a launch, as well as the day before a launch.

The standards we have set for our program, and adhered to include:

1) Total vehicle weight (balloon, parachute, lines, experiment boxes, tracking devices, and cameras) of less than 12 pounds
2) Each payload package has a total weight of less than 4 pounds
3) Packaging and experiments being made of low density materials (plastics and Styrofoam)
4) Using connecting string and clips with breaking strengths of less than 50 pounds
5) Launching in a safe manner at all times.

How long does a typical flight last?

Our balloons typically rise at about 1,000 feet per minute to about 90,000 feet. They descend at about the same rate for an average flight time of about 3 hours.

How high do they go?

Balloons can fly to just over 100,000 feet. This is not space however. At this altitude there is only about 1% of the atmosphere remaining, and the conditions are very similar to space.

Can they go into space?

Due to the nature of how the balloons fly, they cannot rise completely above the atmosphere and into true space, much like a ball in a swimming pool cannot float any higher than the water it is floating in.

Geocaching (cont.)

The community of inspirational and outgoing friends I'm with, the beauty of my ever-present view, and my own heart beating hard and fast, is really why I do this....it's awesome, fulfills and drives my sense of adventure, keeps me fit and active, and is the most rewarding and unusual sport I know.

At the time I am writing this article, according to geocaching.com, there are 2,440,513 active geocaches hidden on Earth (including one that orbits our planet on the International Space Station!) and over 6 million geocachers in the world! New geocaches are published every day.

As an Instructional Technology Coordinator and active member of the Maker Movement, combining technology, science, history, art and physical education is supported and promoted through my curriculum and by my fellow teachers and administrators. Together, we design geocaching hikes that help us teach about geological features and events, botany, and the history of an area first hand, while purposefully working toward environmental goals to better our planet by removing trash we come across and learning to hike and explore with little or no impact on our trail systems. As a Maker, building or constructing the perfect geocache is an inventive goal that serves the dual purpose of contributing to the game and entertaining fellow cachers.

On many occasions over the years, I've taken groups of students on geocaching and foraging hikes. I always make sure to hike the trail ahead of time, so I'm completely familiar with the terrain, the distance, any difficult parts I might want to avoid, and to get a good idea of how many hours the hike will take to complete before I bring kids along. Providing their parents with a map, a list of what to bring and how to dress, and the coordinates of the geocaches we will be finding is good common sense. Of course, the more geocaches kids can find, the better, so I look for good trails that are loaded with caches every 10th of a mile. Working with a science teacher colleague, we've developed activities that engage students while hiking, giving them visual bingo cards with photos we've previously taken of interesting landmarks they should see on the trail. Other times, when a big hike is too much to accomplish, I'll hide my own "educaches" (unofficial geocaches) on our own school campus and let kids use GPS devices to locate them. Inside the geocaches, they will find digital cameras, handouts, and tools to accomplish specific tasks that help teach them about erosion, a type of plant-life, or even the California Gold Rush, for example.

Besides the curricular benefits that I can wrap into geocaching and educaching, my students and I gain some valuable experiences and skills incidentally from this sport. We learn to study maps, elevations and terrain so we know what we are getting into before we start. We learn to use Google Earth and GPS technologies to navigate our way. We learn to be extremely observant in order to find geocaches, which are generally hidden well enough so non-geocachers (muggles) will not accidentally stumble upon them. The harder a geocache is to find, the more fun it is to search for! A geocache might be camouflaged and hanging in a dense tree, or slipped into a crevice between two rocks, requiring tweezers to remove. A geocache may require you to perform a task in order to find it. For example, you might have to lower a magnet into a pipe to retrieve the magnetic container where the geocache is hidden or solve a puzzle in order to get the coordinates for where the actual cache resides. You start looking for anything out of the ordinary, watching for footprints of previous geocachers, noticing "geo-trails" in the weeds that might lead you to the X that marks the spot.

Geocaching also inspires people to venture to places they probably wouldn't go otherwise, or to challenge their abilities and achieve new goals. Personally, there are many days while on a long hike, that I might consider going back, but because I know there are five more caches ahead, I'm motivated to keep going, despite my exhaustion or the long to-do list waiting at home. Many geocachers challenge themselves to find as many caches as possible, setting monthly goals or participating in competitions and challenges. geocaching.com keeps track of all your finds for you, so your ever-increasing number can be quite motivating. I have friends who have found well over 20,000 geocaches, while I, myself, am hovering around 2000 finds, having gotten behind on logging my finds from my last 4 or 5 hikes! Even though, I've spent hundreds, if not thousands of hours hiking the trails in search of geocaches, compared to others, I am still green. I have

seen some spectacular views and hiked some splendid trails that I likely would never have explored had I not been on a geocaching mission. Personally, I've learned to love studying botany, thanks to geocaching, and have been inspired to take weekend workshops on foraging and wildflower classification. I've purchased and borrowed so many Southern California Wildflower books, I can't possibly read them all. These studies have enriched the hikes I take my students on, because I can now teach them about the plant life we are passing, even nibbling on a little wild mustard and fennel along the way and cooking up fresh sage at home, post-hike hunger pang inspired.

Is geocaching interesting to you, but you just aren't much of a hiker? Go Urban Geocaching instead. There are geocaches hidden everywhere. If you've sat at a bus stop, you've likely had one hidden under your bench as you waited. If you leaned against a light post while you waited to cross the street, you likely grazed a micro with your shoulder. If you took your students on a field trip to a museum or landmark, there were certainly geocaches there that you weren't aware of but could have built into your lesson with your students. They are EVERYWHERE. You can incorporate them into practically every lesson and every curricular area of study. The best place to begin learning about geocaching is by doing some research at geocaching.com. There are some very helpful videos there to watch. Sign up for a free account until you're hooked, then upgrade to the premium membership so you can participate fully. Get the geocaching.com app for your smart-phone or get a good GPS device (specifically for geocaching) and go find some geocaches! Understand that your phone will not be as accurate as a GPS device that is designed for geocaching and isn't very helpful at all if you aren't getting any signal. They aren't bad when doing some spontaneous urban caches though and I've been very happy to have the app on my phone many times. Need help? Then do a little internet searching for a local geocaching group in your area. They are generally made up of very helpful people who are glad to help get newbies started. Lots of geocaching folks have uploaded helpful "how-to" videos on YouTube as well. Just remember, the most important thing is to respect the integrity of the game. Leave the geocaches exactly where you find them, be mindful of muggles, respect the environment you find the caches in, stay safe at all times, and teach others what you know.

Attending an educational conference soon? Check the program for geocaching workshops. You might see me there either presenting or helping out. Feel free to reach out to me directly as well. I'm happy to share my experience and knowledge with you! Your students and their parents will thank you for giving them the opportunity to turn learning into a real-life treasure hunt, and you will enjoy being outdoors, fulfilling your desire for adventure while getting exercise and exploring new and wonderful places.

Happy Geocaching!!

Mind Body Program (cont.)

A key component to our Mind Body Program's success was the willingness of our administration to adjust our class schedule to accommodate a Monday Fitness Lab for every student in grades 9 through 11. We separated the labs by grade for age appropriate curricula. The Fitness Lab became the core component from which all other branches stemmed. Our classes follow a specific progression: 9th grade - human anatomy, sex education, practical applications of the components of fitness; 10th grade –foundations of strength and conditioning, exercise physiology, nutrition, stress management, injury prevention; 11th grade – complementary medicine, CPR/AED certification, and a capstone project-based Individual Fitness Plan. All the concepts in Fitness Lab are further reiterated in the activity classes, dance classes and athletic team practices.

Interdisciplinary collaborations are essential to the innovative projects we continue to develop. Our latest collaborations for each grade are: 9th grade, Biology pairs with Anatomy; 10th grade, Nutrition's dietary analysis couples with Chemistry's unit on calories; 11th grade, AED certification joins Physics' unit on joules. These interdisciplinary projects not only help the students see connections, that reinforce the learning, but also provide an awareness of and a showcase for our program with the rest of the school community.

We made technology, and all that it has to offer, an integral part of our new program, as we knew it was vital to help objectively evaluate the fitness of our students. This inclusion of technology, specifically health risk appraisals (HRA's), heart rate monitors (HRM's), and pedometers provides us with data that enhances not only student learning but also performance. HRA's are conducted every semester. We assess biometrics, blood pressure, and the five components of fitness. Since one of our peripheral goals was to make this program more student-centered, we provide the students with their own HRA data. We discuss their strengths and weaknesses to help them better understand their fitness levels. As well, we have found this information invaluable as it has provided us with empirical data that has uncovered cardiovascular risks, eating disorders, and at-risk prescription drug interactions.

In addition to HRA's, HRM's are used in activity classes, dance classes, and the athletic team practices so that our students understand anaerobic vs. aerobic workouts and what functioning in their target heart rate range feels like. Additionally, freshmen wear pedometers for a week to track and later compare their steps to those recorded in their junior year. The final trimester of junior year ends with a culminating project, the Individual Fitness Plan, which is created by every student using a graphical summary of the data garnered from this technology and the previous three years of Fitness Labs.

Although we initially implemented this Mind Body curriculum in 2001, we have continued to hone, change, modify, and expand what we teach and how we expose the students to the connection between a healthy mind and health body. To continue our curricular development, we meet as a department once a week to collaborate and share current ideas and research, as well as individually with our director of the Mind Body Program. Our curriculum is not only significantly different than the one introduced in 2001, but also much more relevant. New activities are introduced as research and trends change: tabata, zumba, yoga, self-defense, Pilates, high intensity interval training, kickboxing, concussion management, heat related-illnesses are just a few of the latest units.

As with all disciplines, ours is and will be a curriculum that constantly evolves as new discoveries are made in the realm of exercise, health and fitness. We plan to stay on top of the latest research so that our program remains innovative, creative, challenging to our student both physically and cognitively and an asset for our school.

How have we been able to realize our goal of creating a 21st century curriculum? Administrative support, professional development, acceptance from the community, continued collaboration with other disciplines and within our department, continuity gained by maintaining our director and her vision, and the desire of our instructors to be lifelong learners themselves.

Science with Humanity (cont.)

Particularly with the intrinsic awakening of their curiosity on an issue that is so timely for them, I could not push them away from the topic. Therefore, I guided the students in creating presentations on bioethics based on research, and each student came up with a debate or discussion topic on which the class as a whole spent time.

Through the high school science curriculum, students are given the basic building blocks to go forward and study science in college and beyond. In high school, at this critical time in students' development of self-concept, students are not traditionally offered a comprehensive opportunity to consider science within a context of their own values. In a world where our technological capabilities may be expanding more quickly than our universal ethics (particularly in genetics), asking young people to consider how to use the tools they are offered is especially relevant. In addition, the traditional high school canon in science offers no concentrated way of examining ourselves as human beings through the lens of science; most courses take biology, genetics, and basic sciences out of the context of relevance to the human experience. My students and I designed a course to address these issues.

The course provides the academic and research tools for students to examine where they came from in evolution and genetics and where they are currently within the global ecosystem. It asks them to examine how their choices affect their bodies, other human beings, and the planet, and how their lives and choices as global citizens can be informed by science. It also poses questions about how humans use the powerful technological tools available to them. After exposure to current research tools and current scientific thinking on human evolution, humans and the environment, humans as observers of the world, uses of technology, and bioethics, students are asked to execute a capstone project to further their learning in an area of their choice.

We titled the class "Science with Humanity" to reflect two meanings: practicing science while considering the effects of the tools on mankind, and learning about being human through science.

The course evolved into five units. In September, my students follow BioRad's Secrets of the Rainforest lesson plan, which includes transformation, separations, and other lab techniques, as well as political, social, economic, and ethical study and discussion.

In October, students use a college-level textbook on physical anthropology to study their evolutionary origins and their extant relatives.

November brings a study of environmental science though the lens of the U.S. food system and current issues in industrial food production. Students then spend six weeks in a curriculum based on Rita Carters' The Human Brain Book, focusing on the anatomy and body chemistry

of consciousness, learning, emotion, and the social brain. Finally, students return to environmental science in a unit on how global human populations are affecting the planet. They are then given several months to design, implement, and deliver their own capstone project, going deeply into a cross-disciplinary topic that interested them from the first semesters' curriculum.

Each unit of the class emphasizes a daylong discussion of bioethics around a topic that captures student interest. The course was approved with the topic-areas left open to allow for relevant and current issues to come into the science classroom as more than ancillary curriculum. The fact that the UC system was able to accept innovative and student-centered curriculum that samples from a variety of textbooks and literature is promising, particularly in the academic area of laboratory science.

Class Blog (cont.)

The requirements opened up to allow the class to explore whatever was on their collective and individual minds in the world of gender. Content may not be as "academic" as I would choose, but it ultimately raises student interest and connects to the larger ideas of the course.

One student noted: "The blog is interesting as it lends itself to the unique personalities of each blogger. They are able to choose an article that sounds interesting to them; it's sort of like a Facebook group among friends where bloggers are posting cool things to share with their peers." Thomas added: "I'm a big fan of the class blog because it integrates the class into my "free time," in other words, instead of a compartmentalized entity that holds my focus for 45 minutes during the school day and then a set homework period each night, Women's Lit becomes a frame through which to view my daily interactions with people, the news, art, etc. This frame is put into place by the blog, which forms an ever-present outlet to express my thoughts relating to the class, thoughts that might otherwise be forgotten in discussion the next day."

As Eleanor Duckworth, the author of *The Having of Wonderful Ideas**, noted, creating meaningful, student-centered, and real-world experiences deepens and shapes student learning in ways that a teacher-led class does not. She said: "The having of wonderful ideas, which I consider the essence of intellectual development, would depend instead to an overwhelming extent on the occasions for having them. I have dwelt at some length on how important it is to allow children to accept their own ideas and to work them through" (Duckworth 13). Her work reminds me that providing students with a forum to find and explore their own ideas is the best way to help them grow intellectually. She added, "The more ideas about something people already have at their disposal, the more new ideas occur and the more they can coordinate to build up still more complicated schemes" (Duckworth 14).

In that spirit, by senior year, my students know enough about books, ideas, and gender to form their own opinions. Using the blog, they make connection after connection between what is happening in popular culture and the news, and texts we are reading such as *A Room of One's Own* or *The Handmaid's Tale*.

There are some challenges: I choose to allow students to post and comment on anything that piques their interest. The blog is moderated, but unedited by me. It allows me to open up an important conversation about citizenship and public writing. It puts the ball in their court—they must develop, think about, and then manage their message and manage their public interactions. In three years, I haven't had to delete or change a post. Students know that the blog is public and anyone can read it (although only class members can post). As 17- and 18-year-olds, they are already deeply engaged in an online world. This experience is one more layer for them to navigate and assess.

I have other goals for this class blog. It's not just a public forum for ideas and debate. I also hope it will encourage students to deepen their own thinking through reading their classmates' responses. I recently asked students to read and respond to two popular articles about women in the workforce by Sheryl Sandberg and Anne-Marie Slaughter. Students had to not only read the articles, but also post responses that built on their classmates' responses. I injected my opinion only once in their dialogue, and noted that, mostly without a teacher, they shaped and deepened their own thinking. One student reflected: "I know that several times I've changed my opinion in the course of writing a blog response because I'd reflected on the subject for a little while."

Ultimately, when we are posting, reading, or discussing, the class operates as a small learning community rather than a teacher-led community. My hope is that students will dive into the discussion and share their passions and opinions and will continue to learn from one another.

*Eleanor Duckworth. *The Having of Wonderful Ideas: And Other Essays on Teaching and Learning.* (New York: Teachers College Press, 2006)

Technology & Silos (cont.)

Imagine that you have a problem with using a Rubens Tube (not Rubik's Cube) in science and by posting your dilemma on Twitter #scichat, along comes someone who has just the right experience and replies. This is the sort of tool we educators can use to share ideas, grow professionally and model 21st century skills in our classroom, so give it a try.

Stop being a conversational or video voyeur on Twitter, Google, Facebook and YouTube. In the 21st century we are now part of a global community. If you are good at something, passionate about something, or have found some interesting article/video, don't just watch it; make a post about it. Let others know about it. Or go one step further and post one of your best lesson plans.

The time has come for you to find a way to add to the community of teachers who are online and striving to improve their craft. My friend, Mr. James Lincoln, makes awesome videos. He doesn't do it because he wants to be a millionaire. He does it because he loves physics and loves sharing his profound knowledge. WOW, the heart of an educator. You too have the heart of the educator if you have made it this far in my article, so get out of your silo and share. Just think, you will be able to model this important skill to your students. They need our modeling, especially those who send us emails from an addresses like pinkyredhedhappyface12@yahoogmail.com or lazyboy33@facebookhotmail.com. Do they need some lessons in social networking? You betcha. Who better to guide them in this process than a professional educator!

Technology in the classroom changes so rapidly no one can ever be an expert, which is exactly why you don't need to be afraid to get your toes wet. Technology is underutilized for taking explicit control of your own professional development. Teachers must develop their professional learning network (PLN), which is a web or network of people who they can communicate with both locally and globally about issues of importance. When we grow our PLN we start to open our minds to a whole new world of possibility for collaboration. A major argument for technology literate teachers is that when we undertake this process of growing ourselves professionally, we become ever more prepared to guide our students in the use of technology.

One technology that both students and teachers alike should know how to utilize is RSS. RSS stands for really simple syndication, which in layman terms is a method of following specific news threads, in this case educational threads, and having them consolidated into your own personal newspaper. Imagine no more searching the web for articles on STEM education. Now each and every morning your extremely personalized STEM newspaper is delivered to your digital doorstep. So ask yourself, what will your homemade newspaper look like? There is great stuff being written, and the more we read the more we grow professionally. But the fun doesn't end here. There is a new 21st century twist. When you read a great article from your personalized RSS newspaper you can then tweet a quick comment about why it was great. In so doing, you are sharing with the world, growing your digital footprint, and curing your digital voyeurism. So start using RSS and making tweets. Carpe Diem.

Oh by the way my twitter name is @Teach_Science and my email is jsneideman@gmail.com should you wish communicate or collaborate.

Editor's note: Additionally, a book, a Twitter site, and a website that are also good resources are: Book: The Connected Educator by Sheryl Nussbaum Beach Twitter: ##edtech via @EdSurge.
Website: Powerful Learning Practice:http://plpnetwork.com/research-based-professional-development-that-works/

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