The Alberta Science Teacher

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From the Editor

As the fall brings shorter days and brief snows, take this edition of the *Alberta Science Teacher* as you snuggle up next to a fire with a mug of hot chocolate at hand and your dog curled up at your feet, and consider it a mini professional development trip. Sure, many of you are reading this online (so you should not have hot chocolate nearby) or you may be allergic to dogs (are you also allergic to other forms of unquestioning love?); regardless, there is something here for everyone.

Many of you have used the past months wisely and have signed up for the annual Science Council conference, which is being held at the Banff Centre in November. Well done! It is going to be a fantastic time with Bill Nye and George Kourounis. I have to admit, though, I am most excited about seeing you there. You're the magician who captivates the imagination of little kids and explains to them about the transformative power of the chrysalis. You are the hero who somehow convinces a room full of Grade 8 trolls to come out from under their bridges and work prosocially. You are the tactician who is given an army of students in your high school physical science classes and devises a way to still do hands-on labs every week. I look forward to shaking your hand, bumping your fist or clinking your glass in a few weeks.

I hope you enjoy this edition of the *Alberta Science Teacher*. It's a bit geeky with a few parts that are downright wacky, but aren't we all?

All the best this fall. See you in Banff.

Dan Grassick

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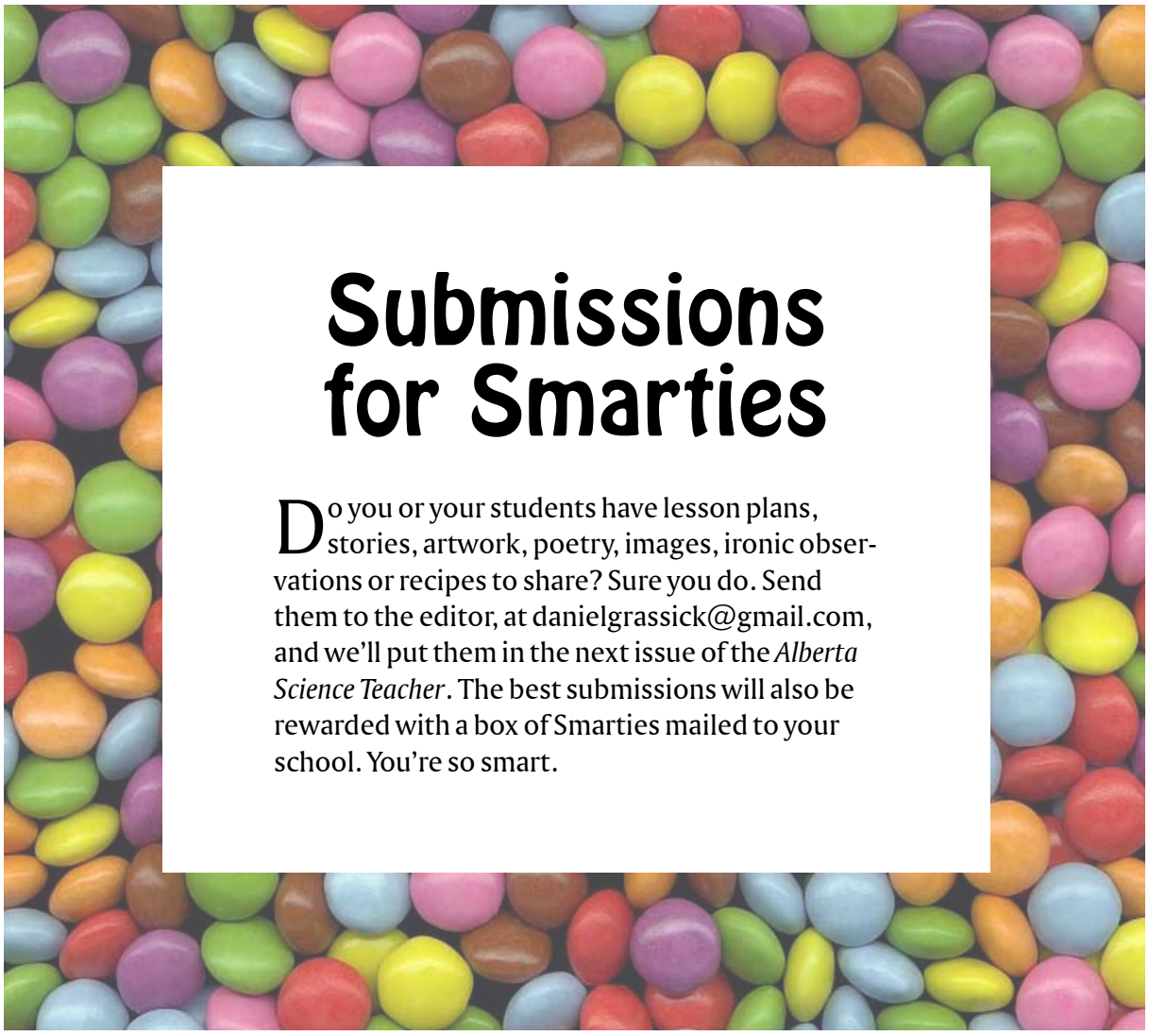


Submissions for Smarties

Do you or your students have lesson plans, stories, artwork, poetry, images, ironic observations or recipes to share? Sure you do. Send them to the editor, at danielgrassick@gmail.com, and we'll put them in the next issue of the *Alberta Science Teacher*. The best submissions will also be rewarded with a box of Smarties mailed to your school. You're so smart.

Conference Teaser

Bill Nye—The Rumours of His Death Have Been Greatly Exaggerated

It seems as though just about once a year, one of my students will report to me that "Bill Nye is dead." Both literally and figuratively, this is not the case. The five years that Nye spent on Disney's *Bill Nye the Science Guy* catapulted him into educational superstardom. More recently he has hosted *The 100 Greatest Discoveries*, on the Science Channel; *The Eyes of Nye*, on PBS; and *Stuff Happens*, on Planet Green/Discovery. But TV hosting aside, who is Bill Nye and how science-y is he really?

Bill graduated with a degree in mechanical engineering at Cornell University (where he studied under the great Carl Sagan). From 1977 to 1990, Nye flexed his mechanical engineering muscle at a number of large Washington State companies (including Boeing), designing everything from equipment for skimming oil slicks at sea to flight control systems and avionics communications equipment. Encouraged by friends and coworkers who thought Bill looked a lot like Steve Martin (seriously), Nye started to do stand-up comedy in the evenings (he says he used to take naps after work).

Eventually, Ross Schafer, Bill's friend and neighbour, was hired to be the host of an evening comedy show, that aired before *Saturday Night Live*, for which Nye would write the occasional joke. Ross also hosted a local Seattle radio show. One day, when answering a question about *Back to the Future*, Schafer pronounced gigawatts as "jigawatts." Nye called his friend to educate him about the preferred pronunciation of the word, which led to a quip, "Who do you think you are, Bill Nye the Science Guy?" From that day on, Nye would call Schafer's show at 4:45 every afternoon to answer a science question from a listener. In 1987, Schafer needed a stand-in guest for his television show, and Nye appeared in his Science Guy persona (bow tie and all) and presented a section on the household uses of liquid nitrogen. This led to regular appearances on the show, and eventually, the Science Guy we know today.

Bill has three US patents filed under his name. The first is for a plastic collapsible pouch that becomes a magnifying convex lens when filled with water. The second is for a digital abacus. The third is for a modern ballet toe shoe that is capable of providing support to a dancer's foot when en pointe.

Bill Nye is currently the executive director of the Planetary Society, an organization founded by

a group including Carl Sagan, which "sponsors projects that will seed innovative space technologies, nurture creative young minds, and be a vital advocate for our future in space."

Perhaps the reports of Bill's death were the result of his disappearance from the public eye after his *Bill Nye the Science Guy* television show went off the air. No doubt an imaginative child with an Internet connection could have concluded that no Bill Nye on TV logically means that the Science Guy had returned to the great carbon cycle.

The *Onion* news parody site posted the most entertaining Nye deathcapade in 2000, under the headline "Science Guy Bill Nye Killed in Massive Vinegar/Baking-Soda Explosion." The article describes the events leading up to the incident as follows:

> On Monday, however, he filled a 5,000-gallon In-Ground Steel Container Of Science to the top with white vinegar and pulled a Giant Red Lever Of Science, releasing a dump-truck load of baking soda into the vat.
>
> "The resulting exothermic reaction was supposed to inflate the Giant Weather Balloon Of Science that Nye had suspended above the vat," Anspaugh said. "But something went horribly wrong and the resulting explosion destroyed the tank, the truck, the balloon, and Nye himself. We're still searching for his body and bow tie."

Antics and satire aside, Bill Nye has developed a bit of an anti-fan club in the past few years, mostly from the American Christian Right. In 2006, Nye was presenting a number of lectures at McLennan Community College, in Waco, Texas. He cited a biblical verse from Genesis: "God made two great lights—the greater light to govern the day and the lesser light to govern the night. He also made the stars." The lesser light, he then pointed out, is not a light at all, but only a reflector. This caused some to leave the audience and caused a bit of a stir online.

Rumours of Bill's passing have trended thrice on Twitter. His most recent nondeath experience came shortly after Big Think, a so-called "knowledge forum featuring the ideas, lessons, stories and advice of leading experts from around the world," posted the *Creationism is Not Appropriate for Children* video on its YouTube channel. In the video, Nye says: "I say to the grownups, if you want to deny evolution and live in your world, in your world that's completely inconsistent with everything we observe in the universe, that's fine, but don't make your kids do it, because we need them. We need scientifically literate voters and taxpayers for the future. We need people that can—we need engineers that can build stuff, solve problems."

Bill Nye's amazing life is not something that can be adequately boiled down into a thousand words, nor is it appropriate to discuss it in terms of his Emmys, Twitter trends or accidental death rumours. More than the Science Guy persona that is his brand, Bill Nye is a scientist to the core, a prolific writer and speaker, and an educator at heart.

Bill Nye will be presenting the closing keynote address at the annual ATA Science Council conference in November.

Zanzibar Jones

George Kourounis—Danger Is His Middle Name

Truth, it goes, is stranger than fiction. George Kourounis seems like the kind of character that George Lucas would dream up. His exploits read like the sorts of bizarre tasks one would have to complete in a video game: Level 1—get into the eye of a hurricane; Level 2—paddle across sulphuric acid lake; Level 3—set foot on new island minutes after it has been spewed from the ocean floor. His accomplishments are so unbelievable that they almost cross the border from fact into Chuck Norris "fact" (George Kourounis doesn't run from erupting volcanoes—erupting volcanoes run from George Kourounis). At a recent TEDx event at Nipissing University, Kourounis described his career as the sort of job that you come up with when you're seven, but "I guess I just never grew out of it."

It goes without saying that George Kourounis lives dangerously. He takes his camera and heads into tornado-spawning storms, burning forest fires and smoking craters. The host of *Angry Planet*, *Storm Chasers*, and *Adrenaline Lab*, George is a familiar face to many television viewers. His desire to show his audience "how bad bad can be" has the same effect on his viewers as watching a car accident; they cannot look away.

As an explorer, Kourounis tries to take his audience to the edge of what they know. He wants to show them the bleakness of the Arctic while dogsledding above the Arctic Circle; he spends time in Rwanda with rare mountain gorillas to share the ways of one of mankind's closest and most endangered relatives; he returns to Chernobyl to take his viewers where they dare not go.

The most common question Kourounis is asked by his fans is "Why?" You'll have to join George Kourounis at his opening keynote address at the ATA Science Council conference to hear his answer.

Zanzibar Jones

Conference Program Snapshot

There has been tremendous interest in this year's Science Council Conference, to be held November 15–17, 2012, at the beautiful Banff Centre. Although registration for new delegates is now closed, here is a quick teaser for ATA Science Council members who have registered.

Tentative Schedule of Events

Thursday, November 15	Opening Wine and Cheese at 7:00 PM
Friday, November 16	Opening Keynote with George Kourounis at 8:45 AM
	Banquet at 6:00 PM
Saturday, November 17	Closing Keynote with Bill Nye at 3:00 PM

A Brief Sample of the Sessions Being Offered

Friday AM

- Learning Targets—The Big Ideas in Science
- Does It Smell Like Science? Investigating Science Literacy Outcomes
- Inquiry in the Garden: Teaching Science with Open-Ended, Living Projects
- Ecosystem Modelling for Science 7, 20 and Bio 20 using Cutting-Edge GIS Technology
- CurioCity: Making Science Relevant for Teens (Grades 8 to 12)
- Sexy Beasts: The Genetic Roots of Animal Social Behaviour

Friday PM

- Below Zero: The Winter World of Wildlife
- Differentiation and Adaptation in Division III Science
- Be Aware of NORM—Naturally Occurring Radioactive Materials
- On The Shoulders of Giants: Multi-Use Demos and Labs for a Spiralling Science Program
- Death to Boredom! Hands-On Learning Activities for Grades 7–9 Science

Saturday AM

- Young Naturalist Expeditions—Journey to the Sea of Cortez
- Science Yoga: Using Your Body as a Creative Learning Tool
- Sensation and Perception: When Biology Meets Psychology
- Assessment for Learning Through Innovative Games and Play
- Flash, Bang, Giggle
- The Highly Agitated Genetics of Angry Birds

Data from the Field

Calgary Teacher Wins $20,000 Science Lab Make-Over

A science teacher at the Westmount Charter School, in Calgary, has won the $20,000 grand prize in the Shell Science Lab Challenge sponsored by Shell Oil and the National Science Teachers Association (NSTA).

Kristy Martens's school has only two science labs. The chemistry lab has inadequate ventilation and damaged lab surfaces; the students share one sink. The physics lab has only two electrical outlets and no high school physics equipment. Despite this, Martens uses laboratory exercises in all of her teaching. She believes that giving students opportunities to explore scientific concepts and gain hands-on experience helps develop critical thinking and problem-solving skills.

"Inquiry-based learning and hands-on experimentation are key elements for encouraging student interest in science," Frazier Wilson, vice president of the Shell Oil Company Foundation and manager of social investment, said in a news release. "Exemplary science teaching is more relevant when it occurs in a quality lab environment where science concepts can be explored by students."

The grand prize includes a lab makeover worth about $20,000, including an $8,000 cash grant, $8,000 in donated equipment, $1,000 in NSTA prizes, NSTA membership and NSTA Learning Center subscriptions for two teachers, and an expense-paid trip for two teachers to attend the 2012 NSTA National Conference on Science Education.

The competition asked Grades 6 to 12 science teachers in the United States and Canada to describe their school's current laboratory resources, explain why those laboratory facilities might be classified as "limited" and describe how they teach science education using those lab facilities. The answers were presented and judged by a panel of educators.

Do You Want to Enter This Year's Shell Science Lab Challenge?

Are you succeeding in science lab instruction with minimal equipment? The Shell Science Lab Challenge gives you an opportunity to share your exemplary approach for a chance to win a school science lab makeover support package valued at $20,000! More than $93,000 in lab makeover prizes will be awarded this year to 18 schools!

Go to www.nsta.org/shellsciencelab for contest rules and applications.

The deadline for completed submissions is November 12, 2012.

It's 10 O'Clock—Do You Know Where Your Kids Are? Are They Playing With a Particle Accelerator?

The Canadian Light Source, in Saskatoon, is Canada's national synchrotron research facility. A synchrotron is a particle accelerator, based on a cyclotron, in which the guiding magnetic field bending the particles into a closed path is synchronized to a particle beam of increasing kinetic energy.

Over the last few decades, synchrotron radiation has developed into an invaluable scientific tool for research in areas as diverse as archaeology, materials research, earth sciences and biomedical research, to name a few, and a rapidly growing number of researchers from academia as well as from industry now use synchrotron techniques.

The CLS offers a number of opportunities for teachers and students throughout the year.

Students on the Beamlines

Challenging students with an authentic inquiry experience, Students on the Beamlines connects high school science with world-class research. The program enables students to become part of the research, to actively participate and learn directly from experimentation, not demonstration. Last year, students from Calgary's Bishop Carroll and Notre Dame high schools took part in the 2012 Students on the Beamlines program.

Their research aimed to find conclusive evidence for the usefulness of small apertures on the Far Infrared beamline, a project first started by a Yorkton-based team of students. The smaller an aperture on a beamline, the less light can get through, but small apertures can help provide high-resolution results. The Yorkton team's results were inconclusive, so Calgary students used a heavier molecule, a cooler cell and a higher maximum pressure in their experiment. They found that a 1.15-mm aperture provided better resolution than the much-larger 12.3-mm aperture, but the quality difference was much reduced in higher-pressure and lower-temperature scans. They hope that future research can include more trials and a variety of sample types.

If you are interested in participating in an experiment, contact the CLS outreach coordinator at outreach@lightsource.ca or 306-657-3525.

Synchrotron Teachers' Workshop—November 3–5, 2012

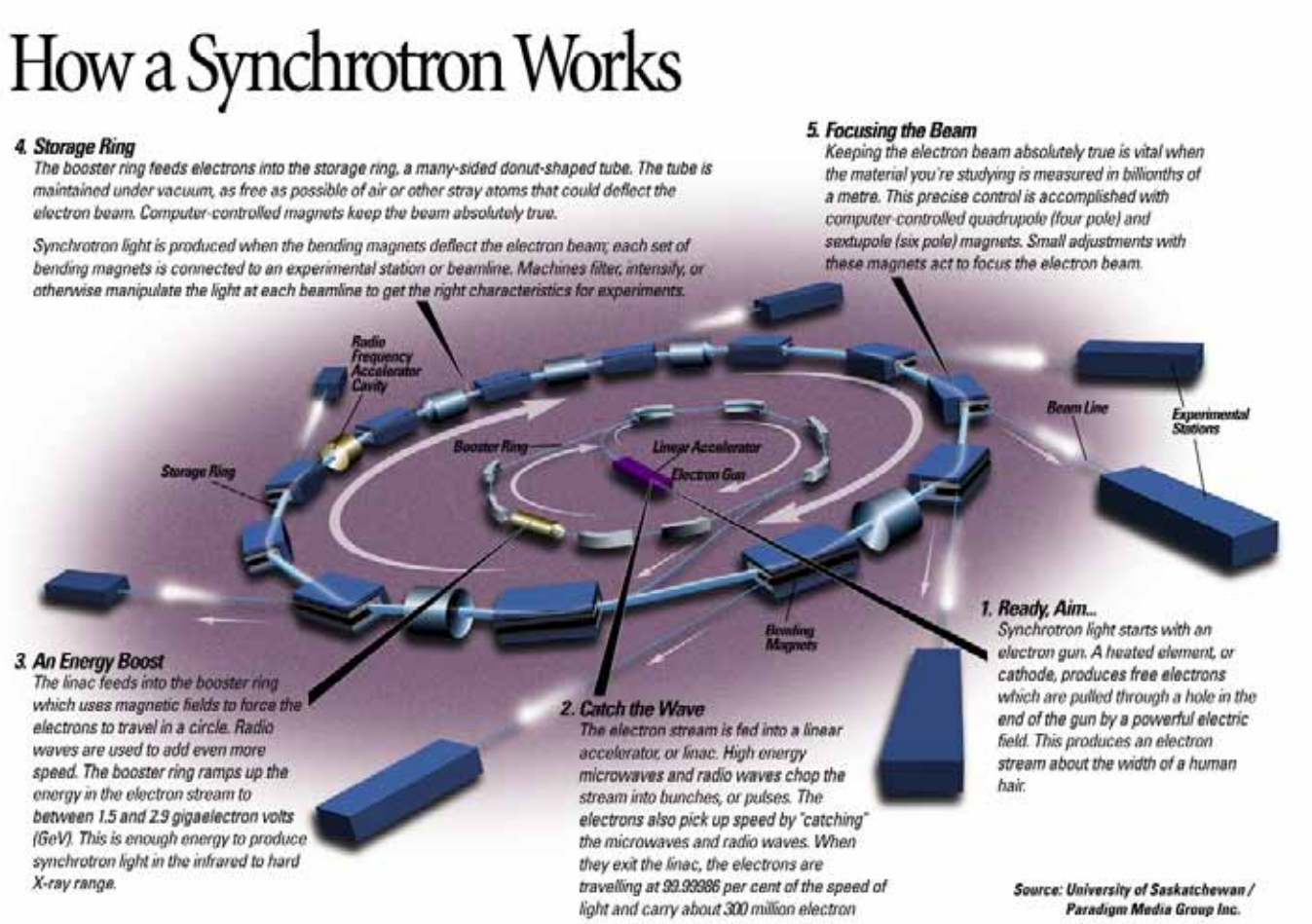
Each year the Canadian Light Source opens its doors to the nation's science teachers, providing a unique opportunity to participate in synchrotron experiments, learn about novel research in many disciplines, network with CLS staff and other scientists who share their experiences and enthusiasm for science, and explore the entire facility. The educational strength of Canada's synchrotron is that it provides an exciting, real-life context for many of the outcomes expected in the science classroom. Thanks to funding from the Natural

Sciences and Engineering Research Council of Canada's PromoScience program, you can apply for financial assistance to help you visit beautiful Saskatoon!

Teachers will learn the basis of synchrotron research techniques, how synchrotron research techniques contribute to nanotechnology and the development of cutting-edge materials, and about some of the possibilities being explored in cancer research. They will come to understand the imaging and therapy capabilities of synchrotron facilities for biological tissues, animal and some human research and how synchrotron techniques can affect environmental chemistry research.

The workshop is three full days of practical sessions, networking opportunities and riveting presentations including workshops on classroom-tested CSI-forensics, acceleration and manipulation of electrons and magnets, and crystals and diffraction.

For more information and to register, check out www.lightsource.ca/education/teacherworkshop.



www.lightsource.ca

Blowing in the Wind

If you've ever been blown in your Honda Civic from Pincher Creek to Fort Macleod, you know that the winds gust mighty hard in Southern Alberta. It should come as no surprise, then, that an organization dedicated to teaching children about wind energy has set up shop in Lethbridge.

Kid Wind provides lessons, activity kits, and contests to engage students in thinking about sources of renewable energy. Easy-to-understand PowerPoint presentations give students the knowledge they need to design their own turbines and compete in local and international competitions. Students learn about energy transformations and efficiency, reducing unintended impacts on birds and bats, and how different turbine blade shapes reduce drag and increase rotation.

This site is well worth checking out: learn.kidwind.org.

Websites and iPads and Apps, Oh My!

Teachers can sometimes be accused of being out of touch with their students. The first time one of my students pulled out an iPhone to look up a fact about the space shuttle, I definitely felt a bit dated, but technology is now a big part of many of our students' lives, and many of our classrooms have iPads in them or at least available to them. Whether you have an iPad or a class "lab," it is difficult to know how to use this technology in the most efficient way, especially in an elementary classroom. Game apps might not be the most useful way to support student learning. iPads, iPhones, and other interactive devices are definitely neat and cool, but it takes some planning to use them for the good of student learning.

To help you, here are some neat interactive apps for elementary science that I would recommend for your class iPads:

- Leafsnap (free)—good for the Grade 6 Trees and Forests unit or Grade 5 Wetlands. Allows you to take a photo of a leaf and identifies the tree from a database. Cool if you are on a forest walk.
- The Night Sky ($0.99)—great for Grade 6 Sky Science. Constellations and planets at your fingertips. Even in the daytime, this is a great app for students to look at the stars.
- Absolute RC Plane Sim (free)—great for Grade 6 Flight. Students can fly a remote-control airplane, which helps them understand the control functions of a plane. (It is also really fun.) There's also a helicopter app.
- Molecules (free)—good for Grade 5 Chemistry. Gives students a 3D look at the structure of some simple molecules. (This is not directly linked to the curriculum, but it is a great way to look at models and get kids thinking about particles.)

As for reference apps, you can find apps for periodic tables, science glossaries, graphic calculators, planet databases or even videos. But the most useful way that I have used the iPads in my class has been to create presentations. I've always used iMovie ($4.99) for the students to create their own videos or presentations on a variety of topics. The iPad can be used to research a particular topic; information, pictures and video can be integrated into a presentation for the class to view. Elementary students are capable of doing some great projects with the appropriate guidance. The results are often amazing and meaningful.

We have even used the video camera on the iPad to record observations of experiments. It was particularly useful to record how high our Diet Coke and Menthos fountains went.

I've talked about apps for elementary grades here, but there are even more that apply to junior and senior high sciences. A great contact for help here is Jane Diner, a science consultant for Edmonton Public Schools. Her website, janediner.blogspot.ca, has loads of information about integrating technology into classroom lessons and features a section she calls "Technology Integration," which has links for websites for all divisions.

It is very easy to get caught up in viewing sites and apps to enhance your lessons, but you need to consider whether it is worth your time—there are so many websites and applications. So what is the solution? The best thing you can do is network with other teachers. Chances are, someone out there knows about a great app for you to use in your classroom. And if you know about one, tell all the teachers that you know.

Chris Sudyk

Spongelab Interactive Hits the Jackpot

If you are looking for lesson ideas, awesome visuals or interactive games to help you reinforce science concepts, look no further than www.spongelab.com. From high-quality diagrams and models to amazing lesson ideas, this site has it all. Perhaps most impressive of all are the site's games, which blow away the basic interactive activities on other education sites. For example, let's look at Genomics Digital Lab and Dragon Breeder.

In the Genomics Digital Lab, students take over an experiment in which a plant is dying and they have to save it. They have to adjust the amount of light, temperature, air composition and water to make the plant thrive. Too simple? Well, that's just level 1! Further levels require students to use their knowledge of different minerals in fertilizers, use different spectra of light, and use their knowledge of the Calvin cycle to make their plant grow.

In Dragon Breeder, students learn how to deduce dragon genotype and phenotype for a number of traits, including body shape, body colour, spot/stripe patterns and wing shape. They do this by starting with two dragons: one homozygous dominant and the other homozygous recessive (although it is not clear at the start which traits are dominant). Students can cross their F1 dragons with the dragons' parents to identify the recessive and dominant phenotypes and then progress to the next level by correctly identifying the genotype for all parent dragons and offspring. As the game progresses, more genes are involved, incomplete dominance and sex-linked traits are introduced, and laboratory dragons have to capture and mate with wild dragons to introduce new variety into the gene pool.

More Story of Stuff Stuff—The Story of Change

When Annie Leonard and her friends at Free Range Studios set out, in 2007, to talk about what she'd learned about the way we make, use and throw away stuff, they thought 50,000 views would be a good result for her "20-minute cartoon about trash." Today, with over 15 million views and counting, *The Story of Stuff* is one of the most watched environmental-themed online movies of all time.

Annie founded the nonprofit Story of Stuff Project in 2008, to respond to tens of thousands of viewer requests for more information and tips on how to get involved. The group creates short, easily shareable online movies that explore some of the key features of our relationship with stuff—including how we can make things better.

The site, storyofstuff.org, contains a number of print resources to use in your classrooms, podcasts for kids to listen to for homework and a number of films, including *The Story of Change*. Leonard's follow-up to the film that started her movement focuses on how people can take action. It would be great to show to your students prior to initiating a service learning project.

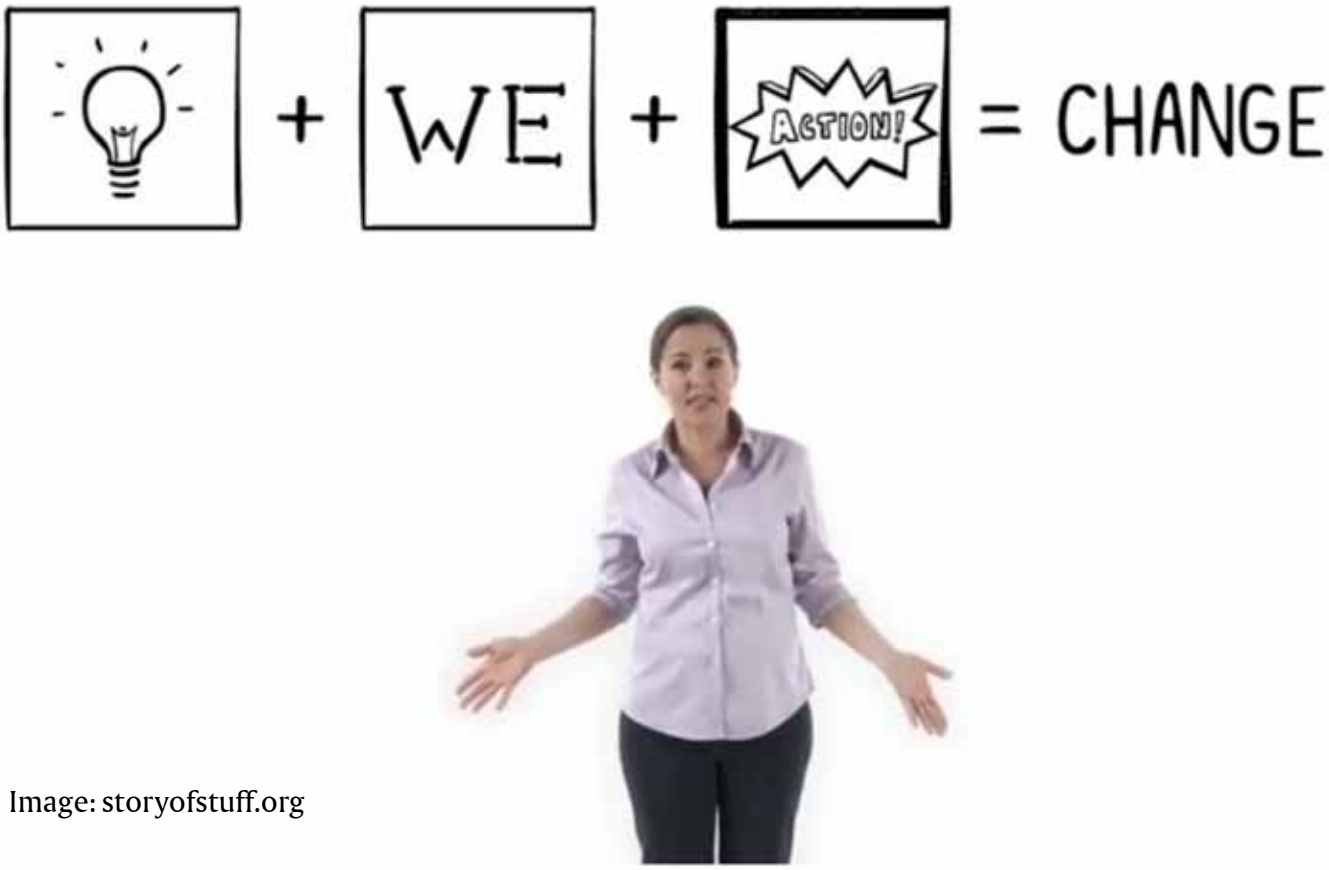


Image: storyofstuff.org

Science in the Cinema

Offered through Alberta Health Services, Science in the Cinema screenings are held monthly in Calgary and Edmonton. Take in a film and participate in a discussion with a health researcher. Admission and popcorn are free.

MOVIE AND RATING	GLOBE CINEMA, CALGARY	GARNEAU THEATRE, EDMONTON
28 Days Later (18A)	Oct 4, 6:30 PM	Oct 25, 6:30 PM
Happy (G)	Nov 8, 6:30 PM	Nov 22, 6:30 PM
The Third Man (PG)	Jan 10, 6:30 PM	Jan 24, 6:30 PM
Innerspace (PG)	Feb 7, 6:30 PM	Feb 16, 1:00 PM
Ce Qu'il Faut Pour Vivre (PG) *(The Necessities of Life)*	Mar 7, 6:30 PM	Apr 4, 6:30 PM

A Sea of Opportunity

The Safe Drinking Water Foundation (SDWF) is a not-for-profit organization that aims to make clean drinking water accessible to all Canadians. Its website (www.safewater.org) contains a number of great water-related resources, fact sheets and kits that you can use at all levels.

Funding for Your School's Water-Focused Action Projects

Funding is available to support the implementation of water-focused action projects in your school. Make learning from SDWF kits the first step in your action project and receive the funding necessary to purchase Operation Water Drop, Operation Water Pollution and/or Operation Water Biology kits. For more information on how to apply for this funding, available to Canadian elementary and high schools, please visit r4r.ca/en/project-flow/funding. If you need any assistance with your application, please contact the SDWF at 306-934-0389 or info@safewater.org, or contact Resources for Rethinking at 1-877-250-8202 or info@lsf-lst.ca.

Safe Drinking Water Foundation Programs

Activity kits and educational resources on a number of themes are available on the SDWF website, www.safewater.org/education.html.

Operation Water Drop (OWD)

Elementary teachers can demonstrate eight scientific tests on their own community drinking water: alkalinity, ammonia, colour, copper, pH, sulphate, total chlorine and total hardness. The students learn the basic need for testing their water to prevent health problems. High school teachers can guide their students to work in groups and test for the above eight compounds, as well as an additional five analytical tests: arsenic, heterotrophic plate count, iron, manganese and nitrate. Students can compare their local water to three other sample waters as well as to a control medium. TD Bank Group has provided funding for schools to receive Operation Water Drop kits.

Operation Water Flow (OWF)

OWF encourages teachers of math, chemistry, biology and social studies to help science teachers give students a more thorough understanding of issues related to drinking water, such as establishing the true cost of water, the social responsibilities of providing safe drinking water, the need for national regulations, and the need for water conservation and source-water protection. Operation Water Flow is available free of charge to schools across Canada.

Operation Water Spirit (OWS)

OWS is a collection of thematic units and lesson plans that will reinforce Aboriginal culture and perspectives on water for Aboriginal students and provide an Aboriginal perspective to non-Aboriginal students about water issues. Operation Water Spirit is available free of charge to schools across Canada.

Operation Water Pollution (OWP)

Operation Water Pollution is designed for use in both elementary and high school classrooms. This program directly connects with science and social studies curricula and is set up as content-integrated lessons. The series of 11 lessons guides students through an examination of water-pollution issues. The students develop definitions of polluted drinking water that serve as the backbone for the other lessons in this program. TD Bank Group has provided funding for schools to receive Operation Water Pollution kits.

Operation Water Health (OWH)

Operation Water Health is designed for use in both elementary and high school classrooms. This program directly connects with health, science and social studies curricula and is set up as content-integrated lessons. Teachers can present one or all of the lessons as they find the material to be most suitable or applicable for their students and related subject lesson plans. The series of eight lessons guides students through an examination of health issues associated with water. The students develop definitions of both healthy and unhealthy drinking water, and these definitions serve as the backbone for the other lessons in this program. Operation Water Health is available free of charge to schools across Canada.

Operation Community Water Footprint (OCWF)

Designed for use with students in Grades 6–12, OCWF directly connects with science, social studies and math curricula and is set up as content-integrated lessons. Students learn about their local drinking water treatment facility and distribution system by undertaking a research project as a class. Students will calculate how much water (source water) is needed to produce one litre of drinking water in their community (including water used in the treatment process, water lost in distribution, etc). Community water footprints and information about current water-related issues and actions that students are taking to alleviate problems and to inform others will be made public on the Safe Drinking Water Foundation's website. Students will be able to compare their community's water footprint to that of other communities across Canada. Students will also investigate the quality of their own community's drinking water.

Operation Water Biology (OWB)

A series of eight lesson plans designed for use with students in Grades 9–12, OWB directly connects with science, chemistry and biology curricula and covers several different aspects of drinking water treatment. The major topics are chlorine, chloramine, ammonia and iron. For each of these there is a discussion explaining what it is and its importance to treatment of drinking water. There are also lab activities for each that allow students to work with small amounts of these substances and see them in action. Students will demonstrate the idea of chlorine demand, create chloramine through a simple chemical reaction, test local samples of drinking water for chlorine and ammonia, and filter water samples with iron oxidized by different processes to determine if one is superior. Every lesson includes additional suggested activities and resources, and references to other sources of information.

Request Sponsored Kits from the Safe Drinking Water Foundation

Every school year, the Safe Drinking Water Foundation sends more than 1,000 environmental education kits to Canadian schools. The vast majority of these kits are sponsored by foundations and corporations, meaning teachers do not have to pay one penny for these extremely valuable educational materials. It is vital to teach our communities' future leaders about drinking-water quality issues and solutions so that they can make the right decisions.

To continue to provide Operation Water Drop, Operation Water Pollution and Operation Water Biology kits to Canadian elementary schools and high schools, the Safe Drinking Water Foundation will be applying to various foundations and corporations again this year. We would like to obtain an estimate of the number of kits desired by Canadian teachers. By knowing what the demand for sponsored kits is in different geographic areas, we will be able to more efficiently apply for appropriate funding amounts.

Information About the Kits

	Operation Water Pollution	Elementary Operation Water Drop	High School Operation Water Drop	Operation Water Biology
Grade level	5–12	4–8	9–12	9–12
What it enables students to do	Create polluted water and clean it up, while learning about the economic realities in different countries that affect their ability to properly treat their drinking water	Test their local drinking water as well as control water samples for eight different components and compare their results to the Guidelines for Canadian Drinking Water Quality	Test their local drinking water, control water samples and rural, urban and raw water samples for 13 different components and compare their results to the Guidelines for Canadian Drinking Water Quality	Perform hands-on tests to learn about biological water treatment, chloramine, chlorine, ammonia and iron
How many you need	One kit per school—the kit is guaranteed to be reusable for at least two years	Each kit is good for one-time use with a class of approximately 30 students	Each kit is good for one-time use with a class of approximately 30 students	Each kit is good for one-time use with a class of approximately 30 students

All of the kits are available in French as well as English.

If your school would like kits, please send an e-mail to info@safewater.org to ask for a kit request form or find the form you need at www.safewater.org/education/order-kits.html.

CAWST

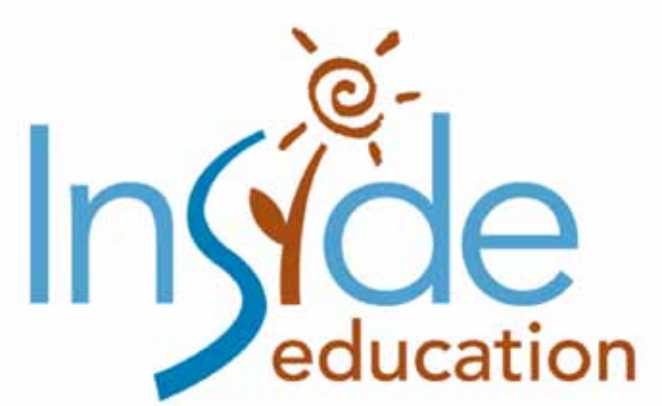
CAWST (Centre for Affordable Water and Sanitation Technology) is a nonprofit organization based in Calgary that provides training to organizations that work directly with populations in the developing world who lack access to clean water and basic sanitation. The Youth Wavemakers Program was created in 2008 to educate and engage youth in global and local water issues and empower them to take action as global citizens.

For the first time this fall, CAWST's Youth Wavemakers Program is opening its Action Grants to K–12 youth across Canada. Wavemakers provides educators with tools to facilitate both creation and implementation of action projects with their students, as well as funding to implement these projects (up to $500 per team).

The deadline for project proposals is November 15, 2012.

Visit wavemakers.cawst.org for more information.

The Inside Scoop on Inside Education Programs



Inside Education has been busy all summer preparing exciting new programs to enhance your lessons related to our natural resources and environment. Inside Education is proud to announce two upcoming all-expenses-paid opportunities designed to inspire your teaching and your students. We invite you to join us in the beautiful Kananaskis region for these unique opportunities.

Energy and Electricity Education Program

November 14–15, 2012, Kananaskis

Inside Education has a long-standing partnership with the ATA Science Council. As part of this relationship, we're pleased to offer one of our popular professional development programs exclusively to Science Council members.

In conjunction with the Science Council conference, we are hosting a program to explore the complex and curriculum-relevant topic of electricity. This program will give you a first-hand look at various sources of electricity including solar, natural gas and hydro. You will learn more about the opportunities and challenges related to energy development in Alberta directly from the people working in the industry. This program is ideal for science teachers from Grades 5–12.

Apply online today at www.insideeducation.ca/electricityenergyPD.

Generate 2013 Energy Literacy Youth Summit

March 14–17, 2013, Kananaskis

Who are the exceptional students in your high school? How can you ensure that they maximize their potential? This dynamic conference will challenge teams of four students and two teachers to think critically about energy development and how students can shape their future by becoming energy leaders. The program will explore the multiple perspectives of Alberta's energy story and give insight into the related science, issues, innovation and careers. After the conference, your team will have the opportunity to make a significant impact in your school and community by implementing a meaningful energy stewardship project.

For more information and to apply, visit www.gener8.ca.

As Canada's largest nonprofit natural resource and environment education organization, Inside Education strives to support you in bringing these topics to life in the classroom.

Get to know Inside Education today—www.insideeducation.ca.

Mass Destruction Instruction—Teaching Resources for Earthquakes, Landslides and Tsunamis

The Geological Survey of Canada has prepared a new series of online teaching resources to help educate students in Grades 3 to 12 about natural disaster risks.

The resources include

- Canadian disaster maps for landslides and earthquakes, and disaster timelines for landslides, earthquakes and tsunamis;
- PowerPoint presentations on earthquakes and landslides, with a focus on Canada (accompanied by a full set of teacher notes);
- full lesson plans for earthquakes, landslides and tsunamis; and
- background information on all three hazards from the Atlas of Canada (http://atlas.nrcan.gc.ca).

Education is the first step in successfully reducing the impact of natural hazards. By teaching students about earthquakes, landslides and tsunamis, we'll help build greater awareness of these hazards and increase preparedness across the entire community.

The lesson topics are geared toward different age groups, with introductory information on emergency preparedness and geological processes for primary grades all the way up to urban planning and hazard mitigation for secondary students.

Subjects include general science, earth science and physical and regional geography. Regional Canadian examples and datasets are used in all lesson plans, which include detailed teacher instructions and answer sheets; all necessary data, map or image resources; student worksheets; and links to online resources.

The resources in PDF files can be downloaded using these URLs:

- ftp://ftp.nrcan.gc.ca/ess/publications/geopub/of_7073.zip (English)
- ftp://ftp.rncan.gc.ca/ess/publications/geopub/of_7074.zip (French).

Choose the lesson type that works best for your class: teacher presentations, classroom discussions, lab activities or demonstrations, student research activities, mapping and map analysis, data plotting and data analysis, questions, quizzes and vocabulary games, or creative writing and design activities.

If you have any questions about these resources, please contact Malaika Ulmi by e-mail at mulmi@nrcan.gc.ca or by phone at 250-363-8808.

Lesson Activities

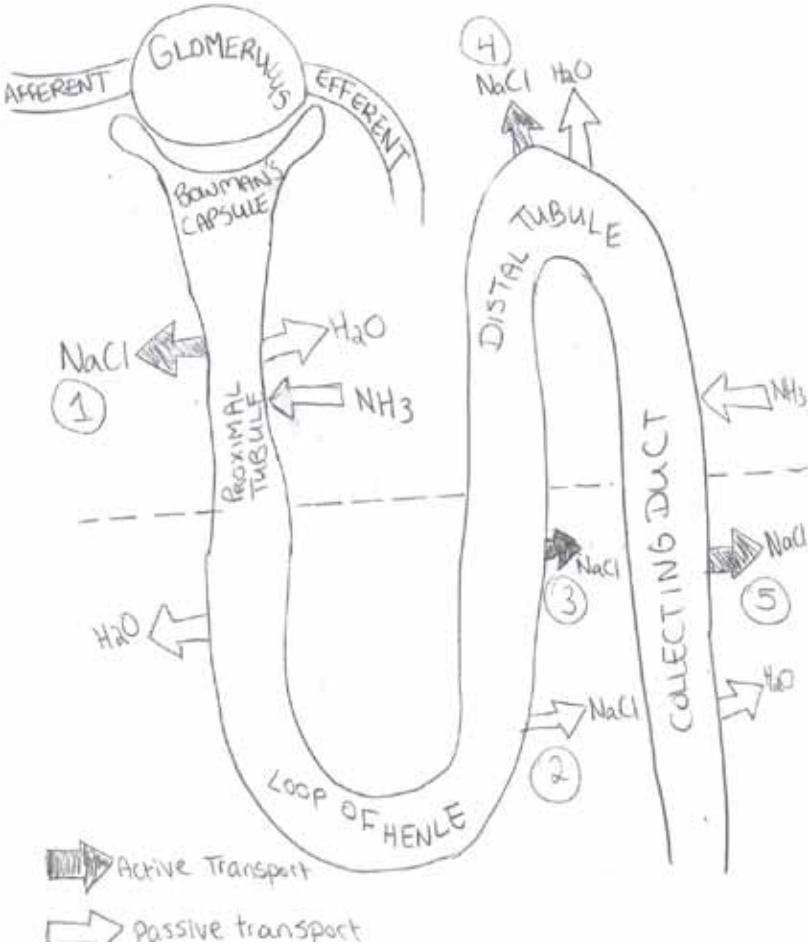
Kidney Konga

This is a great simulation you can use in your biology class to learn or review the functions of the nephron

You will need the following materials for this activity:

- Masking tape
- About 40 cue cards
- Four (4) active transport arrows
- Seven (7) passive transport arrows
- Labels for anatomical features of the nephron as seen in the layout below

On your classroom floor, set up the following layout:



The arrows indicate which student substance should konga into or out of the nephron. The dotted line represents the border between the cortex and medulla. The numbers are areas where a substance should be kongaing into or out of the nephron. The solid lines indicate where masking tape should be placed.

Write the following on the cue cards:

- 6 cue cards with *NaCl (salt)*
- 6 cue cards with *water*
- 5 cue cards with *NaCl (salt) receptor*
- 5 cue cards with *water receptor*
- 2 cue cards with *urea*
- 2 cue cards with *ammonia*
- 2 cue cards with *glucose (sugar)*
- 2 cue cards with *glucose (sugar) receptor*

You will use these 30 cards for the first konga.

On the remaining 10 cards, create 5 more *NaCl (salt)* cards and 5 more *water* cards (explained later).

Hand out the first 30 cards to the students and explain the set-up. Explain that the point of this activity is to simulate urine formation, but also to dance and have fun. Have the students arrange themselves where they think their cue card should start.

- NaCl, water, glucose, urea and ammonia could be in either the afferent arteriole or the area outside of the nephron (the peritubular capillaries).
- Water and NaCl receptors are to be in the peritubular capillaries.

Start the konga! (It might be a good idea to go through the process once without music, so that students understand the procedure.) Students who are not part of the konga line should be encouraged to still dance while they are in the peritubular capillaries. When the konga line gets to each major intersection (glomerulus, Bowman's capsule, proximal tubule, loop of Henle, distal tubule and collecting duct), have students explain which substances should be moving, where and why. Mention that a water or salt molecule cannot move out of the nephron if there isn't an empty receptor available.

After the first konga is completed, have the students trade cards. The students who have urea, ammonia or glucose cards should trade them for either the 5 extra NaCl cards or the 5 extra water cards. This time, the konga can simulate when there is an excess of salt or water in the diet (draw student attention to how much salt/water is present in the "urine").

Danika Richard

Modelling the Human Digestive Tract—Or How to Get Your Students to Never Eat Fast Food Again

There is a lot of information packed into the Grade 8 Cells and Systems unit, but textbooks and films can't do a lot of it justice. The problem with understanding mammalian body systems is that it is really hard for students to visualize how everything works. If you want to help your classes really understand the steps of the digestive tract (and turn them off fast food for a while), I encourage you to do the following demo.

What You'll Need

- A kid's burger meal—get a chocolate shake with it, too
- A pair of pantyhose—tie the waist together and clip off both toes to make a long tube
- J-cloths (preferably the red-and-white patterned ones)
- A large zip-lock bag
- Food colouring
- Yogurt
- Three bowls
- A water bottle
- Vinegar
- A sleeve of crackers

Countdown to Grossness

1. Talk about what role the mouth plays in preparing our food for the stomach. The teeth help digest the food by breaking it into smaller pieces. Have one or two kids tear up the burger and fries into tiny pieces with their fingers. Put the bits of food in a bowl.
2. The tongue and salivary glands help moisten the food so it is easily swallowable, so squirt a little water into the bowl to moisten the food.
3. Now is a good time to talk about the salivary glands. Have students breathe in and out of their mouths to dry out their cheeks. Then have them stick their tongue into the side of the mouth and they will feel saliva squirting out. Invite one kid to do the cracker challenge: that kid will have to chew and swallow six crackers in a minute and then whistle, and do it without drinking any water.
4. After the cracker challenge, tell the kids that we often drink when we eat to help moisten our food so it is easier to swallow. Mix the chocolate milkshake in with the mashed-up food. Delicious!
5. Take the zip-lock bag and introduce it to the class as the stomach—a flexible muscular organ that breaks down food from a solid into a protein goo. Ask kids how it does it and they will mention stomach acid. The hydrochloric acid in your stomach is as strong as the sulphuric acid in a car battery. How does the stomach protect itself from the acid? Mucous. Pour a little yoghurt into the bag and smear it around. Add some vinegar. Take the bits of food and drop them into the bag. Have one or two kids churn it up, trying to break up all the big parts. This is a good time to talk about ulcers and heartburn.
6. Pour the food out of the stomach into another bowl for examination. Talk about the role of the gallbladder. The gallbladder releases bile into the digestive tract to break down fats. Give a student a bottle of food colouring and let him squeeze some into the bowl.
7. Next, pour the contents of the bowl into the intestines (the pantyhose). Almost immediately, liquid will start leaking out of the

stockings. Let it do so while you explain that the intestines are surrounded by a network of capillaries that absorb nutrients from the digested food into the blood. Wrap the stockings with the J-cloths and squeeze the digested food through the pantyhose to imitate peristalsis, which is the involuntary contractions in the alimentary canal that propel food along. This is a good opportunity to discuss peristalsis and reverse peristalsis, since some of your kids will be getting queasy right about now. Ah! The joys of teaching Grade 8!

8. Finally, and unsurprisingly, you will produce "feces" out the far end of the pantyhose, which you can squeeze out into the last bowl (the "toilet bowl"). Explain that feces are merely all of the indigestible plant matters and proteins that we ingest. Amazingly, at this point, at least one of your students will still want to eat the remnants of the meal. This student's unbridled enthusiasm is best used by cleaning up while you and the rest of your students go and draw what happened.

Dan Grassick

Dr. Skateboard Lesson Plan: Dropping In with Potential and Kinetic Energy

Bill Robertson, PhD, is an associate professor at the University of Texas at El Paso. Prior to his teaching career, Robertson competed as a professional skateboarder. Now, Robertson combines his love of extreme sports and science teaching as Dr. Skateboard. A number of print and video resources are available at www.drskateboard.com, but Dr. Skateboard has generously given the ATA Science Council permission to print some of his lessons in our newsletter.

Teacher Notes

Potential energy is the energy stored by matter as a result of its location or spatial arrangement. In other words, this is the energy at the point prior to the release of the object. *Kinetic energy* is the energy of motion, which is directly related to the speed of that motion and the mass of the object. In this activity, potential energy occurs when the marbles are held at the top of the incline and are motionless. Once a marble moves, kinetic energy begins.

It is also important to point out that the marbles have potential energy and kinetic energy while they are moving down the inclined plane. The energy is not completely kinetic until the marble exits the inclined plane. While the marble is moving down the inclined plane, the kinetic energy is increasing and the potential energy is decreasing. The two forces added together remain a constant force that can also be expressed as *mechanical energy*, which is the sum of potential and kinetic energy. The velocity of the marbles depends on the steepness or increased slope of the inclined plane.

Student Laboratory Activity

Purpose

The student knows that there is a relationship between force and motion. The student is expected to identify and describe the changes in position, direction of motion and speed of an object when acted upon by force. The student knows that complex interactions occur between matter and energy. The student is expected to illustrate examples of potential and kinetic energy in everyday life, such as objects at rest and objects in motion.

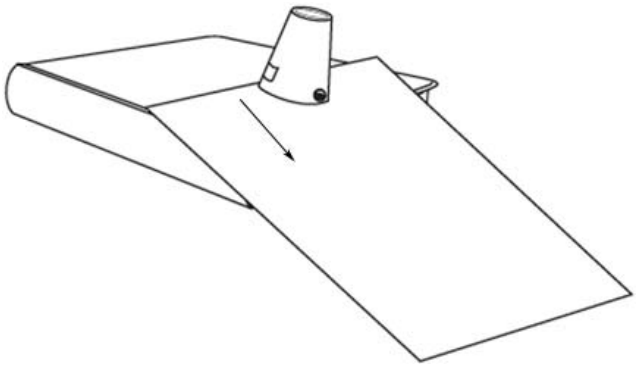
Things You Need

- Paper or plastic cups
- Marbles of different sizes
- Scissors
- Sheets of paper
- Metre sticks
- Centimetre rulers
- Plywood boards to use as inclined planes
- Textbooks of identical size and shape
- Masking tape

What to Do

1. Cut a rectangle out of the paper or plastic cup, so that there is an opening from the top of the cup. The rectangle should be big enough to allow a marble to exit through the opening.
2. Place the cup upside-down on the piece of plywood and lay it flat on a smooth and clear surface, such as the classroom floor. Mark a starting line for the activity using masking tape. At this time, the rectangle opening

should face the edge of the inclined plane. You will place the marble in the cup and when you have the inclined plane in place, you will turn the cup to release the marble down the ramp or inclined plane.



3. Next, place a textbook under one edge of the plywood to form a ramp, or inclined plane.
4. Measure the height of the inclined plane by measuring the height of the textbook.
5. Hold the marble in the opening of the cup. Release the marble from the opening of the cup by turning it until the opening allows the marble to exit from the cup.
6. Make a mark on the floor at the bottom of the ramp using masking tape to record the distance the marble travelled on the flat ground. Record the distance (cm) on the data table. Run this trial three times; record the distance each time and calculate an average.
7. Place another textbook on top of the first textbook and repeat steps 1–6. This will give you two textbooks to measure the height. Record all your results on the data table.
8. Place another textbook on top of the first textbook and repeat steps 1–6. This will give you three textbooks to measure the height. Record all your results on the data table.

Questions to Answer

Once your experiment is done, answer these questions in order to draw some conclusions.

1. Have you ever been on a slide? How would you describe the energy you have on a slide?
2. What is potential energy?
3. What is kinetic energy?
4. When does potential energy change to kinetic energy in the experiment?
5. What is velocity?
6. How do the velocities of the marbles compare on inclined planes of different heights?

Teacher Postactivity Materials

1. Have you ever been on a slide? How would you describe the motion? The teacher can use this as a good way of brainstorming to see if students will identify the types of motion at rest at the top of the slide (potential) and on the slide (kinetic). The teacher should take care not to uncover the purpose of the experiment too quickly; instead, the teacher should facilitate brainstorming to see how students think about such motion on a slide (or inclined plane).
2. What is potential energy? Potential energy is the energy stored by matter as a result of its location or spatial arrangement. In other words, this is the energy at the point prior to the release of the object.
3. What is kinetic energy? Kinetic energy is the energy of motion, which is directly related to the speed of that motion, and describes the object as it is moving.
4. When does potential energy change to kinetic energy in the experiment? In this activity, potential energy occurs when the marbles are held at the top of the incline and are motionless. Once the marble moves, kinetic energy begins. It is also important to point out that the marbles have both potential energy and kinetic energy while they are moving down the inclined plane. The energy is not completely kinetic until the marble exits the inclined plane. While the marble is moving down the inclined plane, the kinetic energy is increasing and the potential energy is decreasing. The two forces added together remain a constant force that can also be expressed as mechanical

energy, which is the sum of potential and kinetic energy.

5. What is velocity? A measure of how quickly an object moves or changes position, with reference to a particular direction, such as up and down or north and south.
6. How do the velocities of the marbles compare on inclined planes of different heights? The velocity of a marble of a given weight should increase as the height of the inclined plane increases. Also, as the mass of the marble increases, the velocity should also increase on a similar inclined plane. This can help students understand the relationship between mass and acceleration that translates to force, or F=ma, Newton's Second Law of Motion, which states that the acceleration of an object depends on the mass of the object and the force applied to it.

What Is Going On?

Potential energy is the energy stored by matter as a result of its location. In other words, this is the energy in an object that is resting above the surface of the Earth. The higher above the surface, the more potential energy the object possesses. *Kinetic energy* is the energy of motion, which is directly related to the speed of that motion and the mass of the object. This set of properties helps describe the object as it is moving. In this activity, potential energy occurs when the marbles are held at the top of the incline and are motionless. Once the cardboard is moved and the marbles begin moving, kinetic energy begins. The greater the mass or speed of an object, the more kinetic energy it has.

It is also important to point out that the marbles have both potential energy and kinetic energy while they are moving down the inclined plane. The energy is not completely kinetic until the marble exits the inclined plane. While the marble is moving down the inclined plane, the kinetic energy is increasing and the potential energy is decreasing. The two energies added together remain a constant amount that can also be expressed as *mechanical energy*, which is the sum of potential and kinetic energy. The velocity of the marbles depends on the steepness of the inclined pane.

Where Does This Happen in Real Life?

Potential and kinetic energy are observed in everyday life with one never even noticing them. For example, in a game of freeze tag, when someone is tagged he or she is frozen and has to stand still; this is potential energy. When saved, he or she starts to run; this is kinetic energy. Another example is an elevator. When the elevator is still and not moving, it is potential energy; once it starts moving to the floor where you want to go, it is kinetic energy. With a roller coaster, the ride has to be still when someone boards it, so potential energy is occurring. Once one is in and secure, the ride begins to move, and this is kinetic energy. The most thrilling roller coaster rides have big changes in potential and kinetic energy.

Extensions

Students can also determine what effect the mass of different marbles would have on the distance that the marbles travel. This can be done by trying the experiment with different sizes of marbles. Students would weigh each marble and then go through the same procedure. Students can also use a stopwatch to time how long it takes the marbles to reach the end of the inclined plane. With the data collected, they can then create a table composed of the time (seconds) the marbles take to move and the distance (centimetres) the marbles travelled. With this information one can find out the speed the marbles were travelling and also calculate the acceleration, and use F=ma to calculate the force.

Student Laboratory Data Sheet

Data Table—One Textbook

Trial	Height of Inclined Plane (cm)	Distance marble travelled (cm)
1		
2		
3		
Average		

Data Table—Two Textbooks

Trial	Height of Inclined Plane (cm)	Distance marble travelled (cm)
1		
2		
3		
Average		

Data Table—Three Textbooks

Trial	Height of Inclined Plane (cm)	Distance marble travelled (cm)
1		
2		
3		
Average		

Musings and Amusements

By the Numbers—Some Quirky Comparisons to Put Things in Perspective

Math by Monty Python—Airspeed Velocities of Unladen Birds

Average airspeed velocity of a kiwi = 0 m/s (unless thrown)

Average airspeed velocity of a European Swallow = 11 m/s (Very few studies of African Swallows exist—seriously!)

Maximum airspeed velocity of an SR-71 Blackbird = 980 m/s (or 3,529 km/h, recorded on July 28, 1976)

The Solar System in a Fruit Bowl

If you were arranging a fruit bowl that represented the masses of the major bodies in the solar system (you know—for your metaphorical art class), it would contain

- a 1-gram sunflower seed to represent Mercury,
- a medium-sized, 18-gram strawberry to stand in for Venus,
- a slightly larger, slightly juicier, 22-gram strawberry to represent Earth,
- a single 3-gram blueberry to make an appropriate Mars,
- a 7.1-kilogram watermelon to represent Jupiter,
- a 2.1-kilogram cantaloupe to represent Saturn,
- a 319-gram apple to stand in for Uranus and
- a 274-gram orange to represent Neptune.

At this scale, the Sun would be a 7.3-ton school bus that you use to drive the fruit around the galactic neighbourhood. Pluto would be a 0.05-gram sesame seed, by the way, but it's no longer allowed on the bus.

Science Verse

To The Chief Musician Upon Nabla: A Tyndallic Ode

James Clerk Maxwell

I.
I come from fields of fractured ice,
Whose wounds are cured by squeezing,
Melting they cool, but in a trice,
Get warm again by freezing.

Here, in the frosty air, the sprays
With fern-like hoar-frost bristle,
There, liquid stars their watery rays
Shoot through the solid crystal.

II.
I come from empyrean fires—
From microscopic spaces,
Where molecules with fierce desires,
Shiver in hot embraces.

The atoms clash, the spectra flash,
Projected on the screen,
The double D, magnesian b,
And Thallium's living green.

III.
We place our eye where these dark rays
Unite in this dark focus,
Right on the source of power we gaze,
Without a screen to cloak us.

Then, where the eye was placed at first,
We place a disc of platinum,
It glows, it puckers! will it burst?
How ever shall we flatten him!

IV.
This crystal tube the electric ray
Shows optically clean,
No dust or haze within, but stay!
All has not yet been seen.

What gleams are these of heavenly blue?
What air-drawn form appearing,
What mystic fish, that, ghostlike, through
The empty space is steering?

V.
I light this sympathetic flame,
My faintest wish that answers,
I sing, it sweetly sings the same,
It dances with the dancers.

I shout, I whistle, clap my hands,
And stamp upon the platform,
The flame responds to my commands,
In this form and in that form.

VI.
What means that thrilling, drilling scream,
Protect me! 'tis the siren:
Her heart is fire, her breath is steam,
Her larynx is of iron.

Sun! dart thy beams! in tepid streams,
Rise, viewless exhalations!
And lap me round, that no rude sound
May mar my meditations.

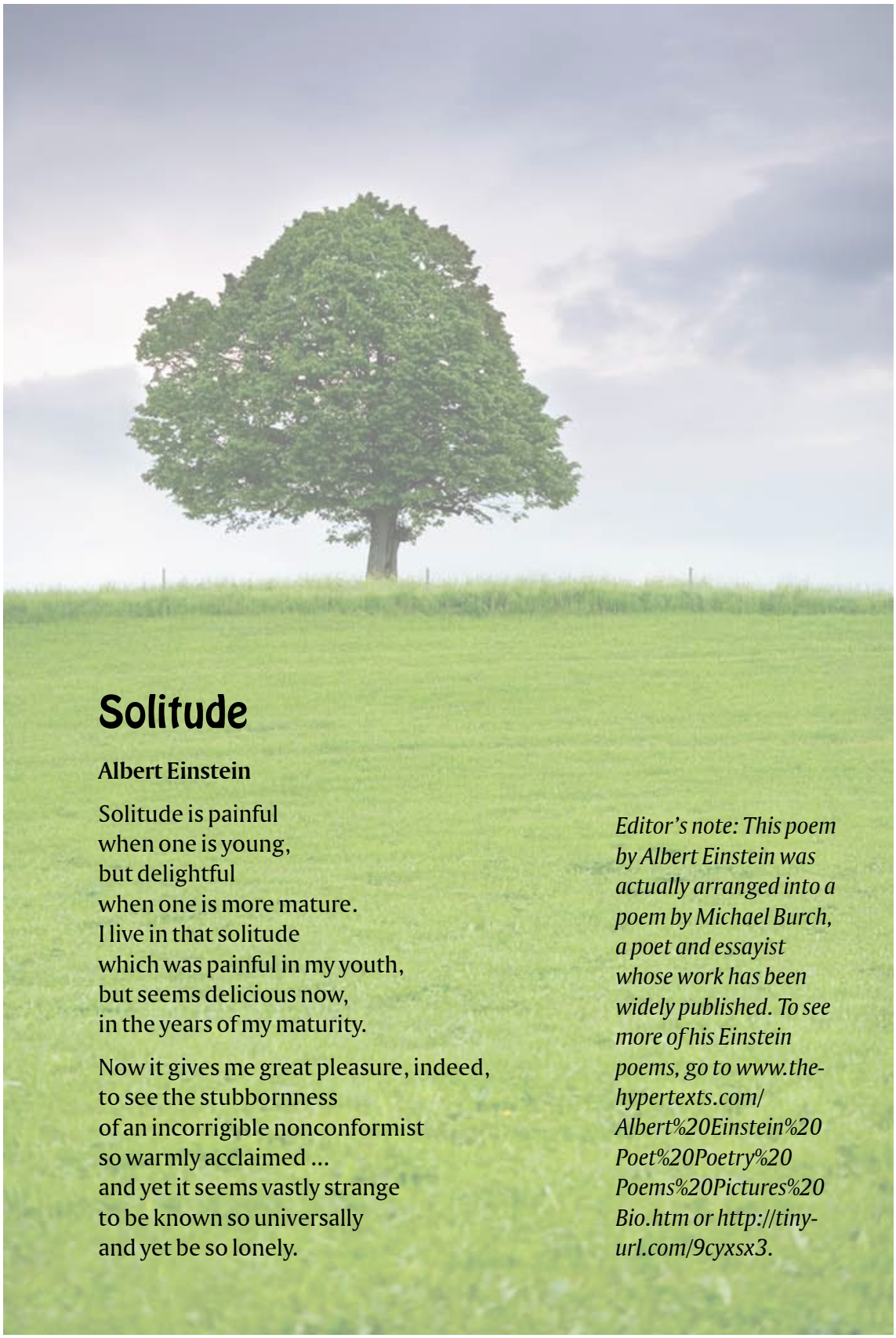
VII.
Here let me pause.—These transient facts,
These fugitive impressions,
Must be transformed by mental acts,
To permanent possessions.

Then summon up your grasp of mind,
Your fancy scientific,
Till sights and sounds with thought combine
Become of truth prolific.

VIII.
Go to! prepare your mental bricks,
Fetch them from every quarter,
Firm on the sand your basement fix
With best sensation mortar.

The top shall rise to heaven on high—
Or such an elevation,
That the swift whirl with which we fly
Shall conquer gravitation.

Editor's note: James Clerk Maxwell (1831–1879) was a Scottish mathematical physicist who formulated classical electromagnetic theory; his work is acknowledged to have had profound influence on 20th-century physics. He also worked with colour theory and the rigidity of trusses.



Solitude

Albert Einstein

Solitude is painful
when one is young,
but delightful
when one is more mature.
I live in that solitude
which was painful in my youth,
but seems delicious now,
in the years of my maturity.

Now it gives me great pleasure, indeed,
to see the stubbornness
of an incorrigible nonconformist
so warmly acclaimed ...
and yet it seems vastly strange
to be known so universally
and yet be so lonely.

Editor's note: This poem by Albert Einstein was actually arranged into a poem by Michael Burch, a poet and essayist whose work has been widely published. To see more of his Einstein poems, go to www.the-hypertexts.com/Albert%20Einstein%20Poet%20Poetry%20Poems%20Pictures%20Bio.htm or http://tiny-url.com/9cyxsx3.

Specialist councils' role in promoting diversity, equity and human rights

Alberta's rapidly changing demographics are creating an exciting cultural diversity that is reflected in the province's urban and rural classrooms. The new landscape of the school provides an ideal context in which to teach students that strength lies in diversity. The challenge that teachers face is to capitalize on the energy of today's intercultural classroom mix to lay the groundwork for all students to succeed. To support teachers in their critical roles as leaders in inclusive education, in 2000 the Alberta Teachers' Association established the Diversity, Equity and Human Rights Committee (DEHRC).

DEHRC aims to assist educators in their legal, professional and ethical responsibilities to protect all students and to maintain safe, caring and inclusive learning environments. Topics of focus for DEHRC include intercultural education, inclusive learning communities, gender equity, UNESCO Associated Schools Project Network, sexual orientation and gender variance.

Here are some activities the DEHR committee undertakes:

- Studying, advising and making recommendations on policies that reflect respect for diversity, equity and human rights
- Offering annual Inclusive Learning Communities Grants (up to $2,000) to support activities that support inclusion
- Producing *Just in Time*, an electronic newsletter that can be found at www.teachers.ab.ca; Teaching in Alberta; Diversity, Equity and Human Rights.
- Providing and creating print and web-based teacher resources
- Creating a list of presenters on DEHR topics
- Supporting the Association instructor workshops on diversity

Specialist councils are uniquely situated to learn about diversity issues directly from teachers in the field who see how diversity issues play out in subject areas. Specialist council members are encouraged to share the challenges they may be facing in terms of diversity in their own classrooms and to incorporate these discussions into specialist council activities, publications and conferences.

Diversity, equity and human rights affect the work of all members. What are you doing to make a difference?

Further information about the work of the DEHR committee can be found on the Association's website at www.teachers.ab.ca under Teaching in Alberta, Diversity, Equity and Human Rights.

Alternatively, contact Andrea Berg, executive staff officer, Professional Development, at andrea.berg@ata.ab.ca for more information.

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Please address all correspondence to the editor, Dan Grassick, at danielgrassick@gmail.com. All manuscripts should be submitted electronically in Microsoft Word format. Pictures or illustrations should be clearly labelled and placed where you want them to appear in the article. A caption and photo credit should accompany each photograph.

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