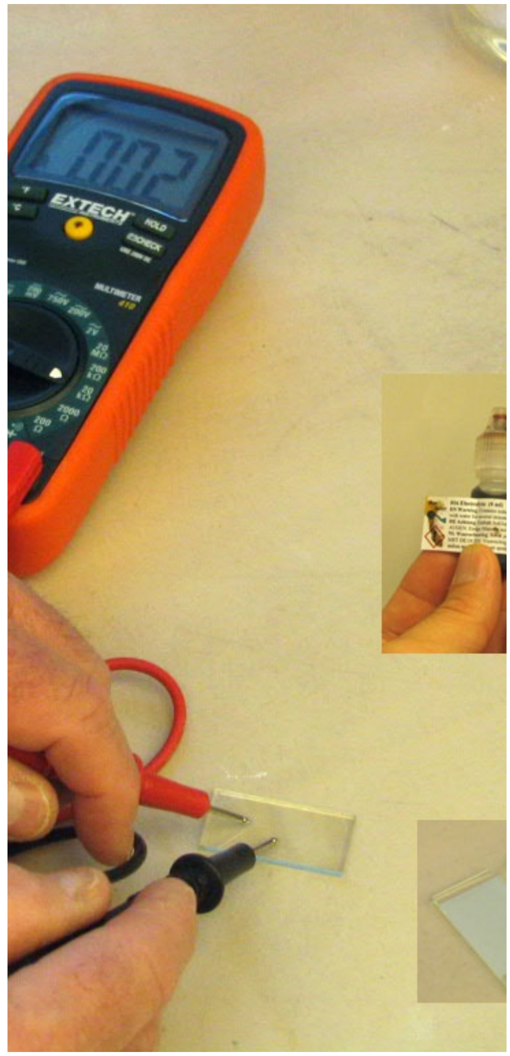


OAPT Newsletter

Summer 2013

Ontario Association of Physics Teachers

Contents

The Prez Sez

Another school year has come and gone. Despite the difficulties of the labour conflict the OAPT had numerous successes and a good deal of growth. There were dozens of OAPT workshops offered across Ontario – after school, during PD days and in pre-service classrooms. Take a look at the events page to **see what you missed**[1] and keep your eye on this page of the website for even more events next year.

The newsletter team launched a couple of new formats so that you can now read your newsletter on smartphones and tablets. Don't forget that past issues are **available and searchable here**[2].

The grade 11 contest saw a 15% growth in students writing the exam. The technical problems of the past have been resolved. **A huge thank you to Jack Sung, Ali Sheikholeslami and the Department of Electrical and Computer Engineering at the University of Toronto** for their tremendous technical support. We couldn't do it without them.

This year's conference was a great success. Lisa Lim-Cole worked incredibly hard to make it all come together. **Thank you so much, Lisa!** You can find the resources from the conference workshops on the website as part of our new **resources page**[3]. There were some problems during the conference with the residence. The management at UOIT were very prompt, apologetic and generous in resolving these. Individuals were contacted and compensated. The OAPT as an organization has also been compensated and will use the funds to make the 2014 conference better than ever. For example, residence next year at U of T will be offered at an even lower rate!

I would like to thank our fantastic volunteers, who make all of these activities possible. You can see who they are and what they did on the **contact page**[4]. If you would like to join this team please contact me and I can find a task the fits your interests, skills and time constraints. Many hands make light work.

Enjoy your summer and see you next year!

Links

1. **http://www.oapt.ca/events/index.html**
2. **http://www.oapt.ca/newsletter/index.html**
3. **http://www.oapt.ca/resources/Conference%20Files%202013.html**
4. **http://www.oapt.ca/contact/index.html**

2013 Conference: Session Reviews

PER: Getting The HOTS* with Brain Research

Session Presenter: **Dave Doucette**

Richmond Hill High School, York Region District School Board
david.doucette@yrdsb.edu.on.ca

by Justin Keung

Dave Doucette's workshop was superb because it was truly a workshop: the bulk of the time was devoted to engaging the participants in activities. In other words, Dave walked his talk, modelling the best practices that we should use with our students. He showed examples of how to put brain research into practice, explaining the importance of **skill contextualization**. He invited us to try to understand the thought process that students go through when learning new concepts, thereby contextualizing the importance of this process.

Dave provided a cooperative small group activity for participants, highlighting some of the engagement strategies that suit the way our brains work. Completing the activity made it more clear what it is about **doing** that makes learning meaningful. Dave finished strongly by encouraging the audience to take risks, to “buy in” to the coming revolution in science teaching.

Dave convinced us that by appropriately connecting the brain’s centres of algebraic/linguistic/pictorial/graphical reasoning in lessons, retention **and enrollment** improve naturally through students’ word of mouth of because they are having fun. What’s more, Dave provided research-driven brain-based teaching strategies that easily integrate into the guided inquiry classroom and increase student engagement while reducing the amount of marking! What could be more amazing?

Links

http://www.oapt.ca/conference/2013/dave_doucette_2013.html

www.brains.org

This site contains practical classroom applications of current brain research. It provides access to suggested readings, hot topics, layered curriculum instruction, newsletters, and workshops. It also contains helpful links to other brain-based websites, and strategies for parents and educators.

www.designshare.com/Research/BrainBasedLearn98.html

This site initially presents 12 design principles based on brain-based learning research. It has access to articles, innovative school designs, e-newsletters and links to national education organizations and publications.

www.jlcbrain.com/truth.html

This is the official Jensen Learning Corporation website. This website contains articles, suggestions on how to stay current with latest brain research, a catalogue of resources and even a brain-based quiz.

www.patwolfe.com

The official site of Mind Matters, Inc. whose mission is to translate brain research to classroom practice. Provides links to articles, training referrals, and workshops.

www.thebrainstore.com/store/

Has a free catalogue of resources available for purchase and teaching tips.

www.unocoe.unomaha.edu/brainbased.htm

Contains information on brain-based learning and its implications for educators.

<footnote>*higher order thinking skills</footnote>

Common Sense Special Relativity

Session Presenter: **Dave Fish**

Sir John A. Macdonald Secondary School,
Region of Waterloo Board of Education
dfish@pitp.ca, @DaveFishPI

by Andrew Moffat

Do Not Be Afraid of Special Relativity … It is Logical!!

This was the message from Dave Fish, who has been on secondment from his teaching position for two years working at the Perimeter Institute to develop modern physics resources for teachers. Special relativity, he claims, is logical, not magical, and is much easier for students to understand than is general relativity, especially when teachers have the right tools and approach.

Newton believed in absolute time, but experiments in electricity and magnetism and Maxwell's resulting equations seemed to say that the propagation of signals in the electromagnetic spectrum occurred at the speed of light regardless of the reference frame. Einstein took Maxwell's ideas and developed this theory of Universal Relativity. Newton's absolute time and Einstein's Universal Relativity were at odds with each other. Einstein was eventually shown to be correct, but that didn't make Newton irrelevant.

Dave emphasized repeatedly that there is just one important fundamental concept students need to grasp to enable all the pieces of the special relativity puzzle fall into place: that there is no way to detect that you are moving from inside a closed space moving at a constant velocity. Dave also confronted a common misconception about special relativity: the notion of 'mass increase'. Of course, mass does not increase with speed. But Dave provided a very useful explanation of what **does** happen: time dilatation and length contraction combine to make less effective whatever forces are applied on the mass.

Dave provided **two worksheets** with cute illustrations designed to be used for a guided inquiry activity with the students:

Links

Worksheets: **http://www.oapt.ca/resources/Conference Files 2013.html**

Alice and Bob in Wonderland Videos: **https://perimeterinstitute.ca/video-library/collection/alice-and-bob-wonderland**

Perimeter Institute Teaching Resources: **https://perimeterinstitute.ca/outreach/teachers/class-kits**

Modelling the Scientific Method With a Stacked Deck

Session Presenter: **Dr. David Harrison**

Senior Lecturer (Emeritus ,CAP Award Winner 2012)
david.harrison@utoronto.ca

by Roberta Tevlin

David Harrison showed us an activity that is easy to do, requires only with a standard deck of playing cards, and is a powerful model of the scientific method. At the University of Toronto they use it with first year students, but it is appropriate for students of all ages.

The activity works best with a supersized deck of cards (available from magic shops), but can be done with any standard deck. Harrison introduced the deck, still in its box, as representing "the universe" and invited us to brainstorm in pairs at least half a dozen patterns that may exist in this universe. **Never to be revealed to the students**, the deck has been stacked to create a simple pattern, e.g. alternating red and black or numerically sequential. An experiment was performed: Harrison revealed the first three cards in the deck. We used the resulting sub-pattern to rule out some of our brainstormed theories and also to propose new theories. Harrison performed a second experiment, turning up three more cards and placing them beside the first three. We drew new conclusions and ruled out more theories based on this subset of six cards. Harrison repeated the cycle a third time, but was careful not to repeat it until the pattern became obvious. It is very important that the instructor never reveal whether or not there was actually an intentional pattern in the cards.

The power of this activity comes in discussing questions that relate directly to the scientific method. For example, "What is the difference between a theory that can explain everything that is already known and one that can correctly predict new results?" or "How do you choose between theories that are equally good at predicting the results?" or "What would be required in order for us to be 100% sure that you know what the pattern is?"

Harrison has a student handout for the activity and a set of instructions for the teacher. (See links below). Having now road-tested this activity, one caveat I can provide is that students may need some advance instruction on what is meant by the term “pattern”!

Links

http://www.upscale.utoronto.ca/Practicals/Modules/SciMethod/SciMethod_Student.pdf

http://www.upscale.utoronto.ca/~harrison/

Retrieval Practices That Make Learning Sticky Review

Session Presenter: **Glenn Wagner**

Centre Wellington District High School,
Upper Grand District School Board
glenn.wagner@ugdsb.on.ca

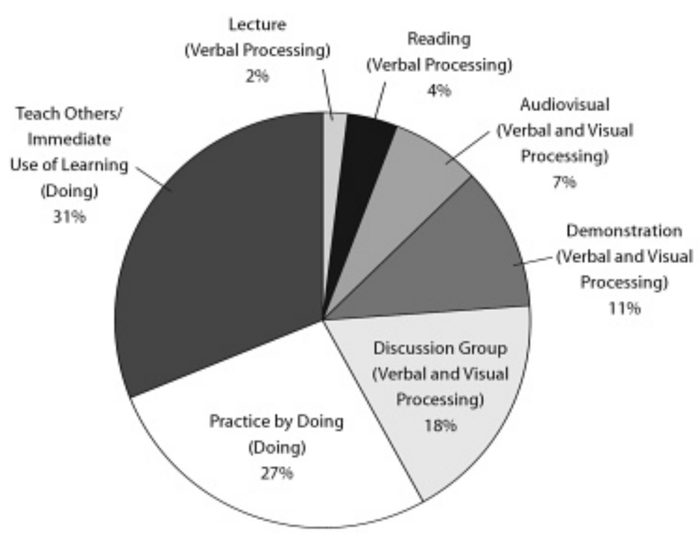
by Nathan Chow

Glenn highlighted important PER practices and activity structures, giving an excellent primer for constructivist teaching methods based on current research.

Drawing on cognitive research by **D.A. Sousa**, Glenn showcased three ways to engage students and teach physics concepts.

FIGURE 11.1.

Pie Chart Showing Average Retention Rate from Different Teaching Methods



Source: Chart created from data in D. A. Sousa, *How the Brain Learns* (Thousand Oaks, CA: Corwin, 2006), p. 95.

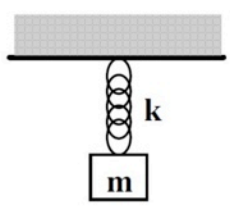
ConcepTests

The first method was based on Eric Mazur's work with **Peer Instruction**. Participants used multiple choice flip cards to answer thoughtfully designed questions called ConcepTests. We then discussed our choices in small groups and shared with the larger group. This allowed us to confront their own mental models, to tear them down if necessary, and to begin to construct new ones.

Ranking Tasks

Ranking Tasks are cognitively different than ConcepTests, requiring students to compare and contrast different scenarios in physics. The scenarios are created to force the student to assess the important factors in a situation (e.g., is mass important?). The classroom structure, however, remains the same: participants come up with their own justified answers, discuss them in small groups, then share with the large group.

A crate of mass m is attached to a spring of stiffness k. The crates are held in place such that none of the springs are initially stretched. All springs are initially the same length. The crates are released and the springs stretch.



	m	k
A	5 kg	20 N/m
B	20 kg	5 N/m
C	10 kg	10 N/m
D	15 kg	20 N/m
E	5 kg	5 N/m
F	15 kg	10 N/m

Rank the time required for the crates to return to their initial position.

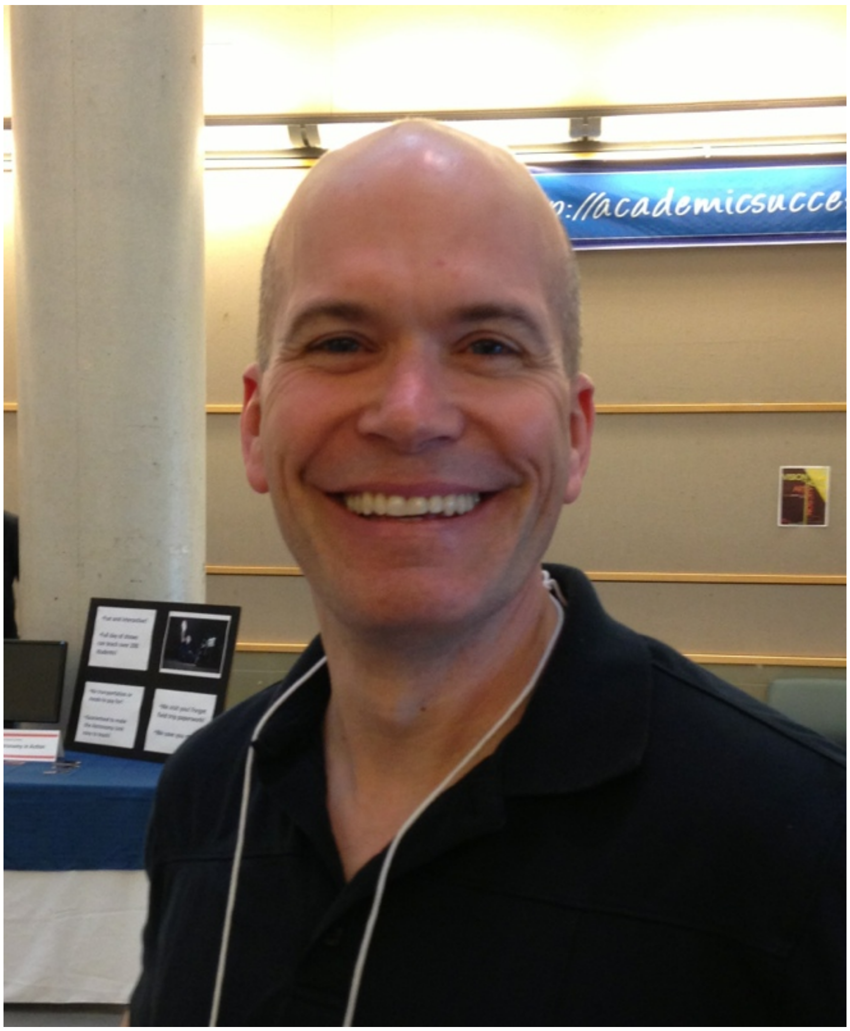
Largest 1. _____ 2. _____ 3. _____ 4. _____ 5. _____ 6. _____ Smallest

_____ The ranking cannot be determined based on the information provided.

Explain the reason for your ranking:

Videos

Wagner uses short videos to present a physics scenario and ask students to identify concepts in the situation. Alternatively, data can be gleaned from the video, such as total horizontal displacement of a projectile, or its initial velocity. Videos that embed this information (i.e. in a speedometer reading) are perfect for this type of activity. **James Ball** was referenced as having a large database of well-chosen videos.



Links

- OAPT Conference Resources
  http://www.oapt.ca/resources/Conference%20Files%202013.html
- D. A. Sousa, How The Brain Learns
  http://www.amazon.com/How-Brain-Learns-David-Sousa/dp/1412997976
- Dean et al., "Classroom Instruction that Works, 2nd Edition" (ASCD, 2012)
  http://www.ascd.org/publications/books/111001.aspx
- Description of Eric Mazur's Peer Instruction
  http://mazur.harvard.edu/research/detailspage.php?ed=1&rowid=8
- Journal Article - Peer Instruction: Engaging Students One-on-One, All at Once
  http://www.compadre.org/PER/document/ServeFile.cfm?ID=4990&DocID=241&Attachment=1
- OAPT's ConcepTest Database
  http://www.oapt.ca/resources/conceptquestions.html
- University of Colarado's ConcepTest Resource List
  http://www.cwsei.ubc.ca/resources/clickers.htm#questions
- Ranking Tasks Exercises in Physics (Student Edition)
  http://www.amazon.ca/Ranking-Task-Exercises-Physics-Student/dp/013144851X
- James Ball YouTube Physics Presentation from OAPT '12
  http://www.oapt.ca/conference/2012/workshops/james_ball%20youtube%20workshop%20spring%202012.pptx

Effective Uses of Technology & Demonstrations

Session Presenter: **Dr. Rupinder Brar**

Physics Lecturer, Faculty of Science, UOIT
rupinder.brar@uoit.ca

by Steven Fotheringham

Although passive observations of demonstrations can provide entertainment for our students, the research shows that passive demonstrations do not improve student learning. The demonstration's effectiveness improves greatly if we can create a more active learning environment. For example, using a "predict, observe, discuss" framework can help achieve a more engaged learning environment. Dr. Brar is involved in research on this topic and will be creating a series of video demonstrations on how to perform effective demonstrations with your classes. This video series is **scheduled for release in May, 2014**.

Basic Principles

When implementing computer technology in the classroom two basic principles need to be followed:

- The teacher must be very comfortable with the software package/platform.
- Any media presented must be brief (~ 5 min. max.) in order to hold student attention.

Dr. Brar's favourite software packages:

Camtasia: The **Camtasia** software allows teachers to create videos of their lessons. These recordings can easily be exported to YouTube.

Windows Journal/Microsoft One-Note: If the teacher has access to a touch-screen computer, this software can be used to write notes electronically. It's like an electronic whiteboard when combined with the multimedia projector. The added benefit is that these board notes can be saved in pdf format.

Personal Response Systems: Dr. Brar is implementing the **Top Hat Monocle** website in his classes. The website allows instructors to create multiple choice questions online and have students answer them during the lecture using their cell phones.

Zooniverse: Scientists create webpages about research topics (e.g., searching for extrasolar planets) on the **Zooniverse** site and encourage students and the general public to help with making observations or analyzing the data. This technique, known as crowd sourcing, is resulting in involvement of thousands of "ordinary people" becoming in scientific breakthroughs.

Links

Camtasia Software: **http://www.techsmith.com/camtasia.html**

Microsoft OneNote: **http://office.microsoft.com/en-001/onenote/**

Top Hat: **https://www.tophatmonocle.ca/**

Zooniverse: **https://www.zooniverse.org/?lang=en**

Chris Lintot from the University of Oxford giving a talk about The Galaxy Zoo (Zooniverse): **http://www.youtube.com/watch?v=j_zQIQRr1Bo**

Biophysics in the Classroom

Session Presenter: **Sara Cormier**

Outreach Coordinator for Physics and Astronomy at McMaster University

outreach@physics.mcmaster.ca

by Greg Macdonald

When you want to know how much power a grasshopper can deliver while jumping, or how much force a tiny worm exerts as it moves, or even the temperature inside a cell, who should you call, a physicist or a biologist?

Luckily, we don't have to choose. We simply ask a biophysicist, which Sara Cormier calls 'a biologist with physics glasses'. Cormier, Outreach Coordinator for Physics and Astronomy at McMaster University, introduced us to several interesting biophysics problems. My favourite problem involved the gecko lizard, which uses millions of tiny hairs called setae ("cee-tee") on its feet to help it climb and hang from surfaces. Van der Waal's forces explain the physics, while the gecko focuses on eating and avoiding getting eaten. With a bit of calculation students can discover that a gecko could support 130 kg in ideal conditions! Perhaps we could use them as handholds as we go wall-climbing… no, that's probably not advisable.

Another interesting biophysics topic that is very accessible to our students is diffusion. Proteins in our cells diffuse to provide signaling and also set up patterns in the cell's structure. Cormier provided both qualitative and quantitative diffusion labs that can be done in a high school physics classroom. Also check out the video link below to the **Thorny Devil**, which uses capillary action to get water.

If (like me) you sometimes shy away from biophysics topics, be sure to click on the link below for Sara's full presentation materials. You'll see what you and your students will be missing out on if you don't bring some biology into your physics classroom!

Links

- Sara Cormier's resources: **http://www.oapt.ca/resources/Sara%20Cormier-Biophysics%20in%20the%20Classroom.zip**
- Thorny Devil video: **http://www.arkive.org/thorny-devil/moloch-horridus/video-10.html**

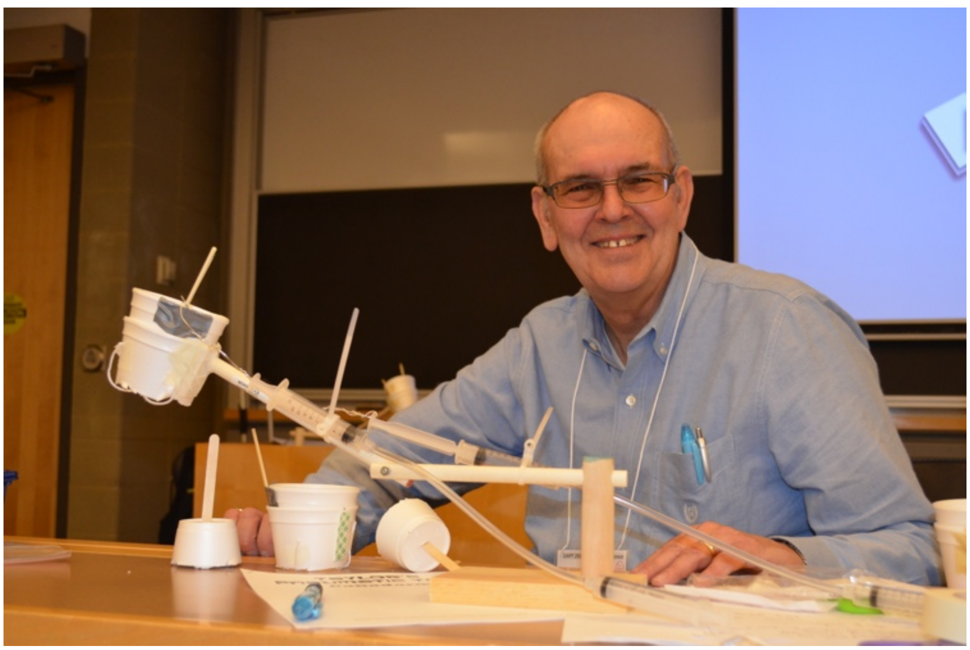
Building your own Canadarm2

Session Presenter: **Stan Taylor**

Retired TCDSB Teacher, Scientists in School Presenter, Editorial Committee: Elements, Crucible (STAO), Durham Region Astronomical Association

SRTENT@ruralwave.ca

by Mhona Russell



In Stan Taylor's workshop we felt like Chris Hadfield himself, manoeuvring the Canadarm2, and were proud of our miniature replica created using pneumatics. This make-and-take session began with a ten-minute video from the Canadian Space Resource Centre demonstrating the use Canadarm2 aboard the International Space Station.

Each participant then got a package containing all materials needed to build a pneumatically controlled Canadarm2 model. Construction required a fair amount of precision: certain tolerances determined whether the pneumatic systems would work. The process of building this model is designed to engage and inspire students as well as to teach them basis fluid mechanics. This project and several other fun projects are fully mapped out with step-by-step pictures and clear instructions in Stan's book, entitled **Taylor's Pneumatic Toys**, available at Indigo and Amazon.

Links

http://stanleytaylorcommunications.blogspot.ca

http://www.cfpa.ca/HOME/default.asp

http://www.amazon.ca/Taylors-Pneumatic-Toys-Stanley-Taylor/dp/0991809807/ref=sr_1_1?ie=UTF8&qid=1372432730&sr=8-1&keywords=taylor%27s+pneumatic+toys

http://www.chapters.indigo.ca/books/taylors-pneumatic-toys/9780991809806-item.html?ikwid=taylor%27s+pneumatic+toys&ikwsec=Home&gcs_requestid=0CKjyitSGh7gCFcbj5wodXTcAAA

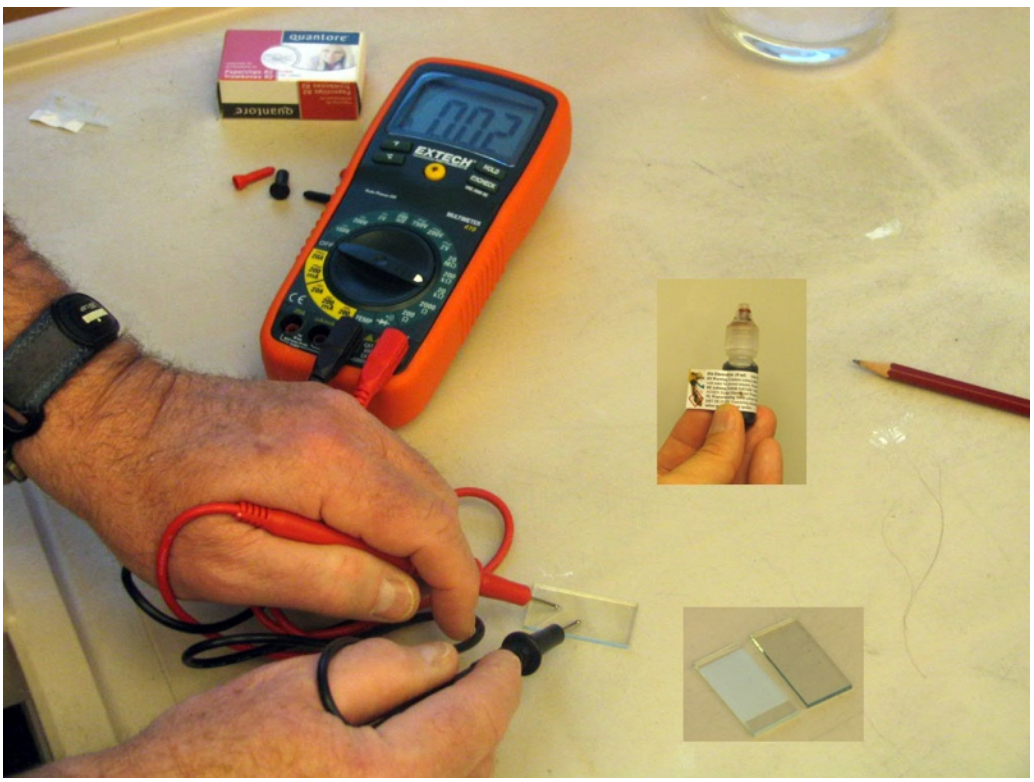
Building Dye-Sensitized Solar Cells

Session Presenter: **Val Kapoustine**

Senior Lab Instructor and Undergraduate Program Director (Physics), Faculty of Science, University of Ontario Institute of Technology

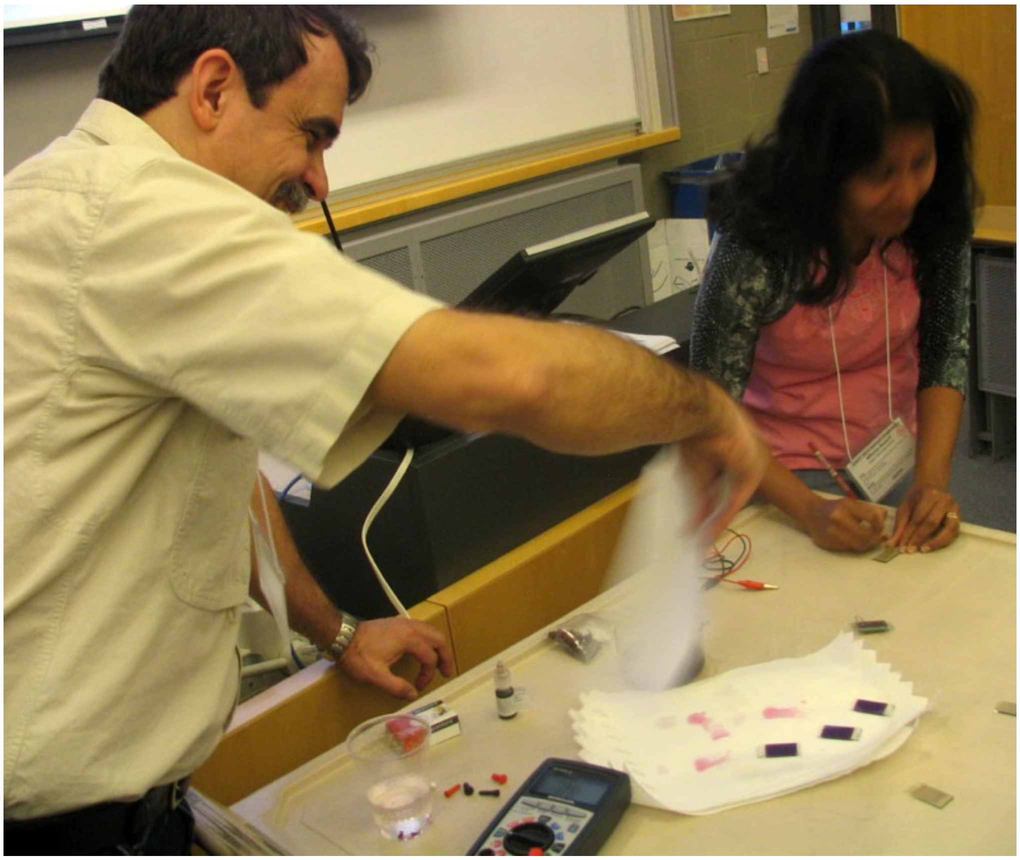
valeri.kapoustine@uoit.ca

by Richard Taylor



One of the things I love about physics is that sometimes, with a little bit of knowledge, you can combine everyday things in a creative way and magic happens. Dr. Val

Kapoustine showed us a bit of that magic in his session about “Building Dye-Sensitized Solar Cells.” Hibiscus tea, iodine and toothpaste can make electricity!



His workshop was based on kits and information provided by a Dutch company, **Man Solar**. Their web site has a “Technology” page that explains the “little bit of knowledge” that you need. They compare solar cells with fuel cells and with the process of photosynthesis that takes place in green plants. The kits they sell provide everything you need for your class to build six solar cells. However, many of the items in the kits are probably already in your school’s labs, so it would be cheaper to just buy the supplies of the specialized items: glass slides coated with a tin oxide transparent conductor and titanium dioxide, plus a potassium triiodide electrolyte. Man Solar also offers dried hibiscus flower tea for the dye, but it might be more fun to experiment with other plant dyes. Our small class managed to complete three solar cells during the session, and most of the time was just waiting for the dyed titanium dioxide to dry.

This would be an ideal lab activity for grade 9 Science students in the Electricity unit, or for grade 11 Physics students to help them make a connection between the electricity unit and their studies of alternate energy sources.

Thanks, Dr. Kapoustine, for pointing out this fascinating technology and guiding us through the construction of our own solar cells!

Links

Man Solar: **http://www.mansolar.nl**

2014 Conference: Looking Ahead

2014 OAPT Conference Theme: STEM Education

(**S**cience – **T**echnology – **E**ngineering – **M**athematics)

K-12 STEM education is an ambitious international movement intended to match graduate skills to future economic growth by exploiting a rich new paradigm for independent thinking. Refocusing K-12 education on problem-based learning with clear emphasis on engineering principles, STEM promises a generation of innovators and entrepreneurs adaptable to changing economic needs and imposing challenges.

Recent research indicates the cognitive skill sets for STEM education are disproportionately represented among physics teachers. Together with the close scaffolding of STEM and physic s content, this places physics and physics teachers at the core of STEM education success.

The OAPT is being proactive in preparing its membership for the opportunities and challenges of STEM education. The 2014 conference is intended to foster dialogue within and outside our membership and begin building the architecture needed to direct this initiative.

The 2014 OAPT Conference Committee extends an invitation to K-12 educators, university and college professors, mathematics & technology educators, engineers, innovators, entrepreneurs, and students (at all levels) to participate in

our STEM conference . This may be in the form of workshops, information booths, papers, demonstrations, research or other.

Submit your proposal and our committee will work hard to assemble the most dynamic and inspirational OAPT conference yet – our 35th!

Call for Presenters for the 2014 OAPT Conference

We are already gearing up for 2014 conference at the University of Toronto. Once again we will have a slate of invited workshop presenters but we also want to make sure that our members have a chance to present. **We are looking for 5-minute demos, 15-minute presentations as well as longer workshops**. We are also interested in for informal one-on-one exchanges.

Educational institutions and non-profit groups with information and resources for teachers are invited to apply for an exhibit table.

We would like to have some **make-and-take tables**, so let us know if you have demo or other resource that you would like to share.

For more details and information about how to submit a proposal please go to:
http://www.oapt.ca/conference/2014/call_for_presenters.html

Lisa Lim-Cole, Dave Doucette

Coordinators, OAPT Conference 2014

Demo Corner

The singing rod (in the modern age)

by B. Lasby and J. O'Meara

University of Guelph

blasby@uoguelph.ca; **omeara@uoguelph.ca**

This is a classic classroom demonstration of resonance, nodes, anti-nodes and standing waves that has been described elsewhere[1,2]. The modern age twist that we are advocating is the coupling of this classic demo with free (or relatively inexpensive) sound analysis software, thereby allowing for quantitative analysis of resonance while experimenting with a number of important variables.

Figure 1 shows one of the authors and the apparatus. In this photo we are using an aluminum rod that is about 3 feet long and approximately 1/8 inch in diameter. Holding the rod at the midpoint slide a damp sponge or piece of resin from the midpoint to the end repeatedly. Make sure that your movements are as smooth and continuous as possible and always in the same direction. Don't give up! As with any musical instrument, this demonstration will take a little practice to perfect. Try varying the speed and pressure of the hand holding the sponge if you are having difficulty getting the rod to sing. For assistance in developing your technique there is a short video clip on our outreach page (**www.physics.uoguelph.ca/outreach**) under the Teaching Resources tab, in which we demonstrate how to induce resonance. An alternate means of causing the rod to sing is to strike it sharply on the ground on its end while holding it upright at the midpoint.

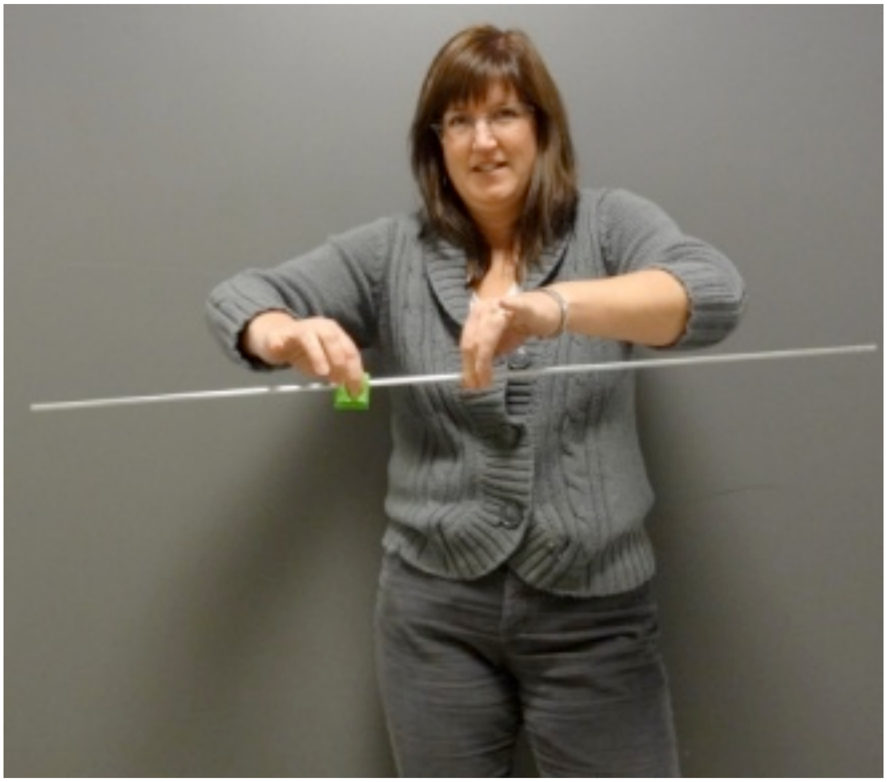


Figure 1: Using the apparatus

There are a number of free sound analysis software packages available for download that can be used on a PC or Mac in conjunction with a microphone[3] (e.g. *Seventh String Tuner*, *Frequency Analyzer* by Relisoft, and *Raven Lite*). All of these packages have a frequency analyzer that will allow you to find the fundamental frequency and to determine the orders of the harmonics observed in the resonance of the rod. There is also a very useful iPhone/iPad app[4] called *Audio Kit* that allows for similar experimentation. Figure 2 shows the screen shot collected via iPad and the *Audio Kit* app of the frequencies emitted by a 1-inch diameter, 3-foot long hollow aluminum rod made to sing by being struck firmly on the ground. As is clear in the figure, the fundamental frequency appears at approximately 550 Hz, with harmonic peaks at approximately 3 times, 5 times, 15 times and 25 times this fundamental frequency. The *Audio Kit* app also has the ability to view an oscilloscope trace of the sound being emitted by the rod. *Audio Kit* sold for $6.99 on iTunes at the time of writing.

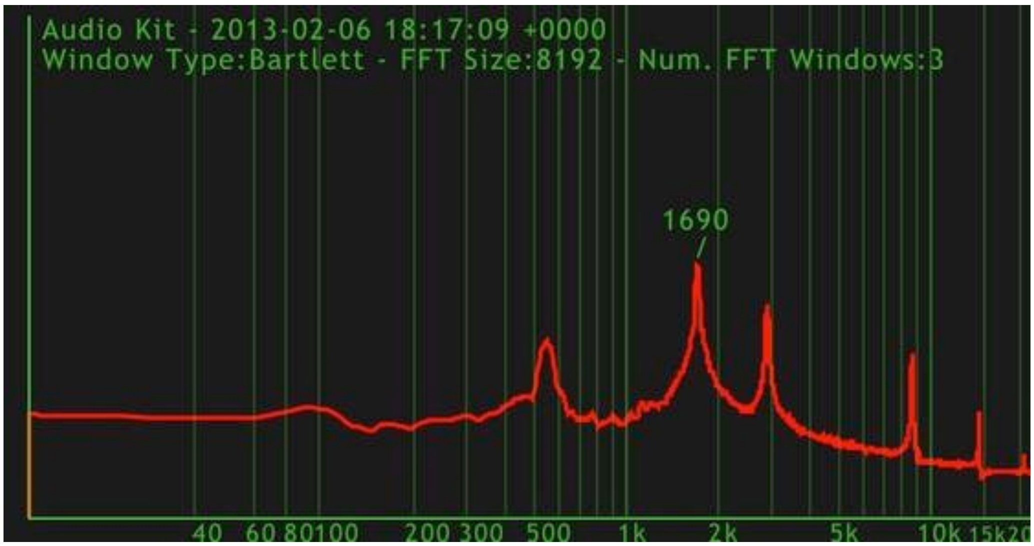


Figure 2: Frequency Analysis

When sliding the sponge along the bar you are setting up longitudinal vibrations in the rod. When you hold the rod at the midpoint, you restrain it from vibrating at that location; in resonance terms, a node is created at that point. If you rub the rod slowly, you will produce waves of a relatively low pitch. This pitch is the natural frequency of the rod and depends on the length of the rod as well as inherent properties of the material. By sliding the sponge more quickly, you can generate higher frequency sounds corresponding to the harmonics of the natural frequency.

Some of the variables that you can experiment with in the classroom include:

- speed and pressure of the hand holding the sponge/resin
- rods of different lengths, different materials, solid vs. hollow, etc.
- holding the rod at different nodal points: try one that is ¼ of its length from one end to cause resonance at higher frequencies

- generating transverse waves in the rod by holding it at a point that is ¼ of its length from one end and then striking the rod in the middle from the side
- generating both longitudinal and transverse waves at the same time by striking the rod with a solid object close to the end with a slightly diagonal blow
- demonstrating the Doppler effect by getting the rod to sing and then twirling it above your head in a horizontal circle

The sky is the limit and, with some free (or relatively inexpensive) software, a classic classroom demo becomes a quantitative hands-on learning experience for your students in a modern age makeover!

References

1. **www.oapt.ca/resources/democorner.html** - look for “Sound Demos with Rods and Tubes” by R. Meisel, originally published in September 2001
2. **www.physicscentral.com/experiment/physicsathome/rod.cfm**
3. Oliver D., Underwood J., Marotta D., Kane J. and Scott M. 2013 Four free software packages related to the physics of sound. *The Physics Teacher* **51** 101 - 104.
4. Kuhn J. and Vogt P. 2013 Analyzing acoustic phenomena with a smartphone microphone. *The Physics Teacher* **51** 118 - 119.

Getting Involved

Write to Us

Don’t want to present at the conference but have something to share? Send it to us!

We are always looking for news about what’s going on in the physics classrooms of Ontario. You don’t have to be a PER or STEM expert to get published in the Newsletter! Send us your classroom anecdotes, physics jokes, project ideas or samples of student work. Send us your comments about the newsletter or about the direction that physics education is taking. We want to hear from you!

Email to **newsletter_editor_8@oapt.ca**

Where in the World do you read Your OAPT Newsletter?

Each fall issue we feature an OAPT member reading the OAPT Newsletter in a location that we are privileged to be able to reach. Send us your summer photos!