The TISP Canada Courier #12

February 14, 2016

"Binary for the younger set" - A game changer?

The *Courier's* long-time contributor, Dave Hepburn, has developed a new module and lesson plan for teaching binary numbers to third and fourth graders. Trial runs have been exciting!

First there was Monopoly. Then there was Trivial Pursuits. Now we have Binary Chairs. Will it gain lasting fame like the others… or maybe not?

On December 10, Dave Hepburn and his bride of 59 years, visited the local primary school to assist with the inaugural demonstration of the new game of "Binary Chairs". The background of this game goes back to the TISP workshop held in Tampa, Florida, about three years ago. On that occasion TISP-Canada Champions Anis Haque and Dave were part of a team which was challenged to come up with a simple signalling system for the junior schoolers. One thing led to another and the eventual outcome was, of course, binary coded alphabetic symbols.

But how tare you going to get this concept across to grades 3 and 4?

Why, simple. Visualize a row of 5 small gumball machines. The machine on the far right is really small and can only hold 1 gumball. The next one over to the left can hold twice as many or 2 gumballs. The machine next over to the left can hold twice as many again, or 4 gumballs. And so on to the last, on the extreme left is a giant holding 16 gumballs.

So in effect we have a total of 16 + 8 + 4+ 2+1 = 31 gumballs.

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TISP Reports from the Regions

These columns summarize recent work, upcoming events as well as trials and accomplishments of TISP volunteers from across Canada. Reports are also filed at *www.tisp.ieee.ca*.

Britsh Columbia

TISP volunteer Elroy Switlishoff is preparing activities at his school in BC for National Engineering Month this March. Building popsicle stick bridges will be one of the challenges.

For information contact Elroy at ***a7b60338@telus.net***

Alberta

TISP volunteer Rossitza Marinova is busy organizing the 2016 Canadian Math Kangaroo contest in 33 centres across the country. You will find details here: ***https://kangaroo.math.ca/***

Able to help at a Math Kangaroo event near you? Contact Rossitza! ***rossitza.marinova@concordia.ab.ca***.

Manitoba

Witold Kinsner, TISP Champion in Manitoba and President of IEEE Region 7, is making plans for the Verna Kirkness Discovery Week for ingenious students (to be held in June 2016) and the annual Space Camp for high-school students (to be held in July).

For information contact Witold at the University of Manitoba at ***witold.kinsner@umanitoba.ca***.

Ontario

Wolfram Lunscher of the IEEE Ottawa Section met with a high-school age group of youth to plan an EPICS (***http://epics.ieee.org/***) project for their summer camp. He also plans to meet with middle-school age children of the Christie Lake Kids inner-city youth program to lead the "Binary Numbers" lesson plan over three evenings in February.

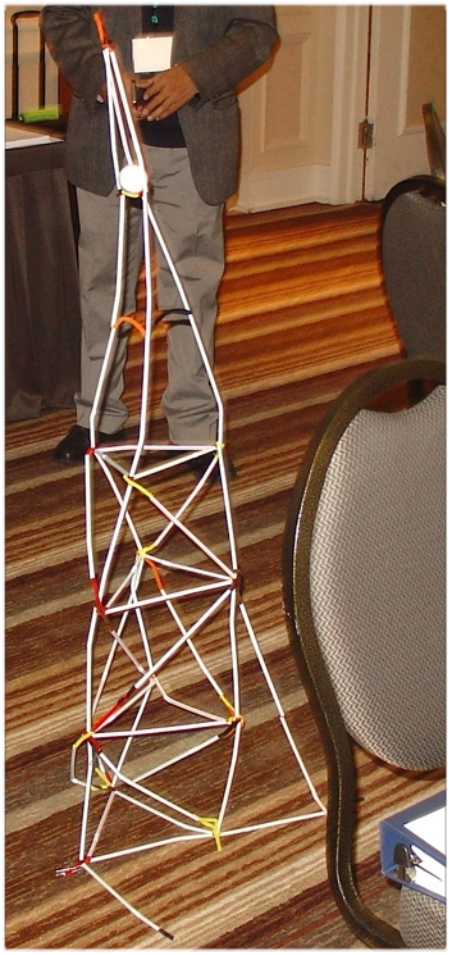
For information contact Wolfram at ***wlunscher@gmail.com***

TISP volnunteers Patrick Finnigan and Haridos Sarma will hold a workshop with the Toronto District School Board's STEM group to discuss ways for teachers to integrate TISP lesson plans and demonstrations of the engineering design process.

For more information contact Pat at ***pjfinnigan@gmail.com*** and Haridoss at ***hari56@rogers.com***

TISP Champion Murray MacDonald (London Section) is organizing two activities ("Ship the Chip", "Tall Tower") at the London Children's Museum in March. He is also preparing a TISP presentation at the Ontario Physics Teacher Association's conference in Kitchener in May.

For information contact Murray at ***murraymacdonald@rogers.com***



The TISP Tall Tower contest at the STAO 2015 conference produced in the tallest one yet in the TISP universe. Can you top 43 inches? ***TryEngineering.org*** !

Meeting Ontario's Science Teachers for Ten Years

2015 marked the tenth year of IEEE's contributions to the Science Teachers Association of Ontario conference. TISP volunteers attended this big event and have sent us their report.

The common readers of the *Courier* will recall several occasions in years past when TISP made itself known at STAO, the annual conference of the Science Teachers Association of Ontario. Never mind that STAO celebrated 125 years of science education, 2015 was special for us as well, because it was a decade ago that two strong supporters of fostering engineering in our schools kick-started IEEE's presence at the 2005 meeting in Toronto. US-based Doug Gorham is now Director of IEEE's Education Activities. David Hepburn is one of the oldest TISP volunteers in Canada. Both met again at STAO'15.

IEEE and TISP-Canada made a special effort to celebrate our 10-years at STAO. Aside from the well-worn booth on the exibit floor – as always very well managed by Dave and his colleagues Patrick Finnegan, Murray MacDonald and Haridos Sarma – TISP had arranged with the STAO organizers an information session and a workshop for tachers. Doug gave an overview of TISP activities worldwide, and TISP-Canada volunteers hightlighted their recent activities. Bringing science and engineering into the classrooms and minds of students remains a strong challenge for all of us. To the delight of the organizers and presenters, our high aspirations were soon meet and surpassed during the TISP workshop by an enthusiastic bunch of teachers. The challenge for them was to engage in the ***TryEngineering.org*** "Tall Tower" lesson plan. The winning team did a superb job, coming up with a 43-inch tall tower. They surpassed the previous world record set for this exercise by one half of an inch. Well done!

For further information about TISP and STAO, contact Dave at ***dehepburn@sympatico.ca*** or Haridos at at ***hari56@rogers.com***

Photo credit: Dirk Werle

TISP-Canada's booth in the STAO exhibit area was well-equipped to meet the teachers during their session breaks

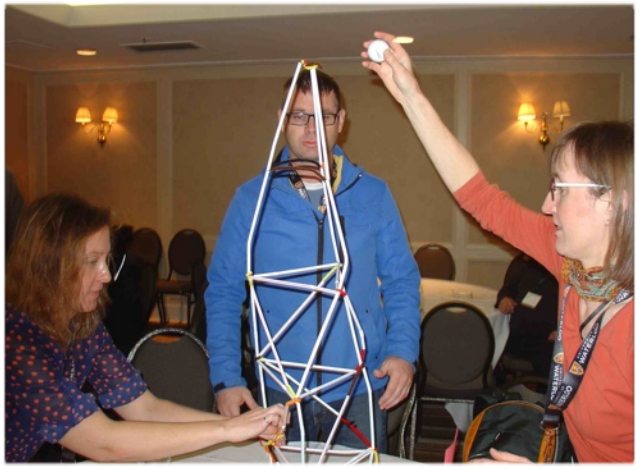


Photo credit: Dirk Werle

Teachers are preparing for a stress test of the tallest tower yet: a golf ball had to take up a precarious position at top.

Photo credit: Dave Hepburn

Movers and shakers of with flags of either "1" or "0" behind a line-up of binary chairs marked 1,2, 4 and 8.

Photo credit: Dave Hepburn

Encryption and decyphering teams at Dave's local primary school are hard at work. Bletchley Park - here we come!

"Binary for the younger set" *(continued from page 1)*

But these machines are specially made, so that when a student pulls the lever, *all* the gumballs in that machine fall out together. In other words, each machine is either full or completely empty. They are also specially equipped with a small person, whose job it is to refill the machines, but only when told to do so.

Next up, each machine is equipped with two flags, one which pops up when the machine is full and another which pops up when it is empty. The "Full" flag has a "1" on it, and the "Empty" flag has a "0" on it.

Suppose, then the middle machine above was empty, the students would see the following flags:

Machine:	**16**	**8**	**4**	**2**	**1**		
Flags:	**1**	**1**	**0**	**1**	**1**	= 27	Yes?

And so on. We can leave the remainder to your fertile imagination.

But, hey, where does the game of Binary Chairs come in?

Easy. Take 5 chairs and line them up in a row against the wall. Take 5 sheets of paper and mark them respectively, with 16 8 4 2 1, and stick one sheet on the wall above each chair. Sit one student on each chair and give him/her one sheet of paper with a "1" on one side and a "0" on the reverse side.

Sit all the other students at the classroom tables, 3 or 4 to a table. Tell the 5 students on the chairs to hold up a "1" or a "0" as they feel like, and get the students at the tables to write down what the total number of gumballs comes to. The table which comes to the front of the room with the correct number is the winner of that round. You can also have girls against boys, and mixed groups, and even students against teachers etc. (Word has it that last Thursday, the school Principal didn't do so well). But anyway, even though each class was an unusually long 100 minutes, they were still at it when the bell rang. At closure, each student was given a sheet listing all 26 letters of the alphabet in binary code for use at home.

Photo credit:Anis Haque

Teacher and student preparing the array of containers with 1,2,4,8 and 16 ping-pong balls for the binary number lesson.

Photo credit: Anis Haque.

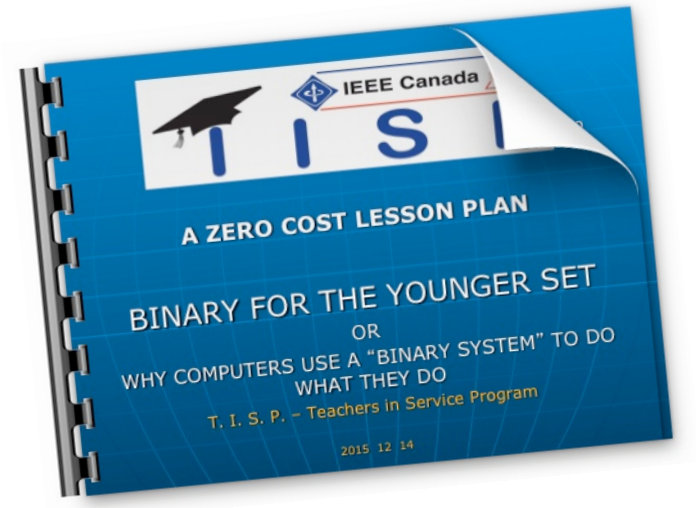
Anis engaged in binary number exercises with the "younger set" in a Calgary classroom.

Now, all Dave has to do is to find some way of merging his "Binary Numbers" lesson plan and presentation into a standard TryEngineering.org format. Anyone who knows how to do that, please raise your hand.

P.S. The gumballs, being of uncertain origin, were *not* given to the students.

Dave Hepburn

For further information on "Binary for the younger set" contact Dave at ***dehepburn@sympatico.ca***.



A Postscript to binary

Trials and tribulations for submitting the binary lesson plan for *TryEngineering.org*

Following David Hepburn and Anis Haque's initial idea to come up with a fun and useful activity to introduce the younger set to binary numbers, the initial lesson plan was put to the test on a number of occasions with great success.

Anis recently reported that he has used this activity 13 times in different schools with grade 3 and grade 4 students. He has reached more than 500 students in southern Alberta. The very first session was initiated in January of 2013.

Dave has drafted and sent to the IEEE editors in Piscataway a full length lesson plan "Binary for the Younger Set," to be added to the roster of plans on the ***TryEngineering.org*** web site, so the lesson can be accessed widely. Hopefully, approval will be forthcoming soon. In the meantime, the draft of "Binary for the Younger Set" is available at ***www.tisp.ieee.ca/publications.html.***

Have you tried www. tryengineering.org yet?

IEEE's web site for engineering education and training resources has a wealth of resources for teachers, students and parents. There are new lesson plans added every year. Check them out!

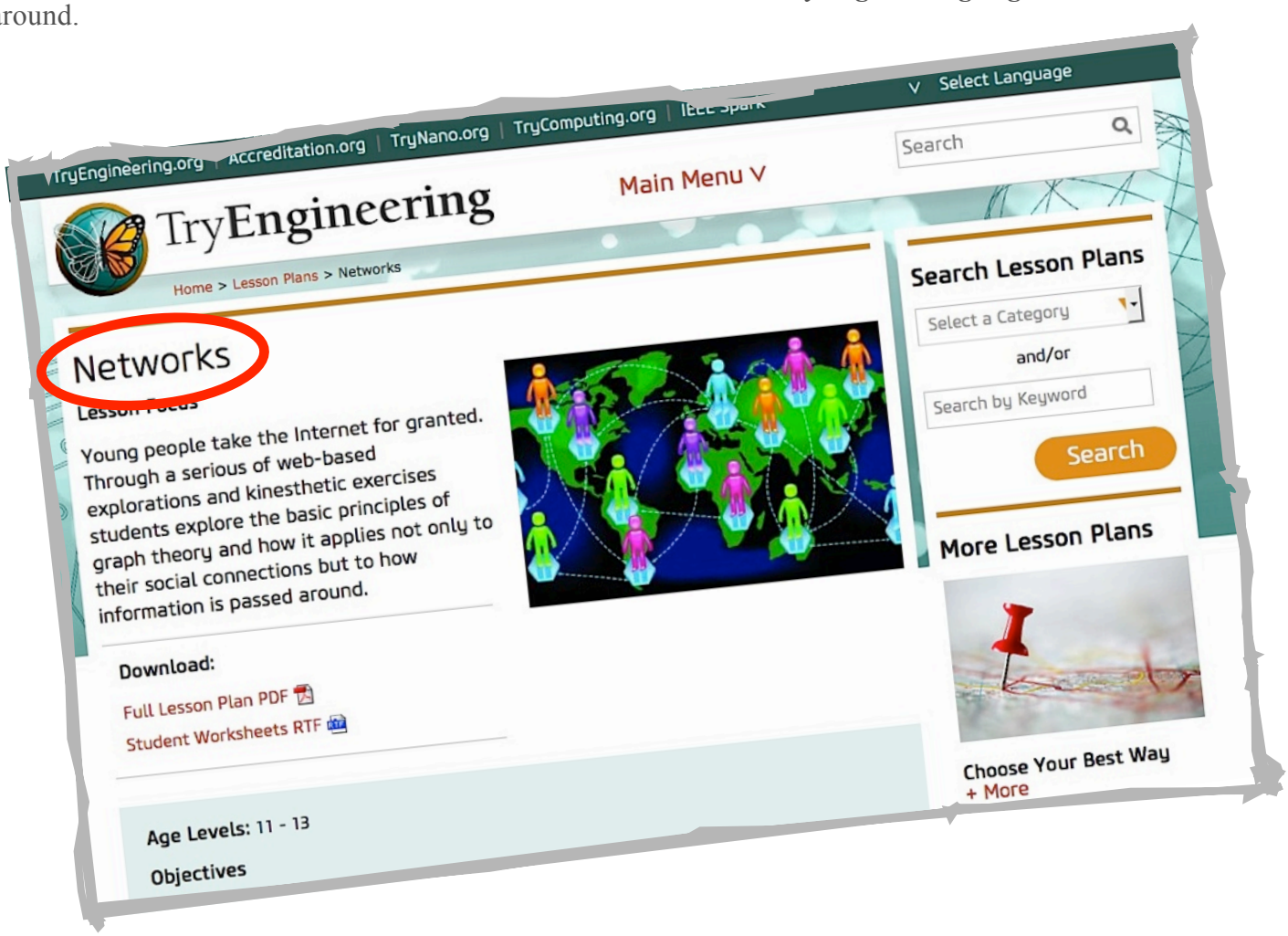
One of the recent additions to the roster of more than 100 lesson plans at ***TryEngineering.org*** is focusing on a feature that we encounter almost everywhere today: networks.

Many people, and young people in particular, take the Internet for granted.Through a serious of web-based explorations and kinesthetic exercises students explore the basic principles of graph theory and how it applies not only to their social connections but to how information is passed around.

In this lesson plan, students are introduced to a number of concepts and practical networking of the engineering kind:

- how basic graph theoretic concepts are essential to the Internet;
- how information is moved around a network;
- how traffic on the Internet can be monitored, and
- how social media networks provide access to personal information.

Go visit ***TryEngineering.org***!



TISP volunteers in Montreal receive recognition

IEEE's Montreal Section recently honoured several TISP volunteers at the Annual General Meeting of the Section and welcomed a new member to their active TISP team. Well done!

Many TISP volunteers across the country make their time and expertise available on numerous occations, helping to advance the goals of the Program in many practical ways. Their work does not go unnoticed. A recent event in Quebec is testimony to the IEEE's effort to recognize the many hours of volunteer work that its members dedicate to the Teacher In-Service Program.

Last October, during its 2015 Annual General Meeting, the IEEE's Montreal Section honoured several TISP volunteers for their efforts. Senior Section officials Dr. Saliah-Hassane Hamadou, Hans Hovide, Raphael Tana and veteran TISP champion Dr. Anader Benyamin-Seeyar noted their accompishments and were on hand to present nicely framed certificates of recognition to TISP volunteers Ahmed Abdulla, Geoffrey Alleyne and Salam Benchikh.

Shortly thereafter, the IEEE Montreal Section welcomed a new member to its team of TISP volunteers. Dr. Ana Aguiar is a post-doctoral researcher at the École de technologie supérieure (ÉTS). *Bienvenue,* Ana!

On a related note, the TISP team in Montreal also went through a change of guard last year in that its founding member and TISP-Canada champion Dr. Anader Benyamin-Seeyar passed on the duties to Ahmed Abdulla. In 2016 and onward, Ahmed will be formally representing the Montreal Section at the national TISP-Canada Committee as well.

Ahmed Abdulla

You are welcome to contact Ahmed for any TISP-related activities within IEEE's Montreal Section and beyond at ***ahmed.abdulla.ca@ieee.org***

Photo credit: IEEE Montreal Section

Members of the Montreal TISP team proudly displaying their certificates of recognition at the annual general meeting 2015.

Photo credit: IEEE Montreal Section

Salam Benchikh is receiving her certerficate from the Section Chair and from TISP champion Anader Benyamin-Seeyar.

Some Guidelines for Contributors

Articles and news items are welcome and should be sent by email to the Editors.

The *TISP Canada Courier* accepts feature articles up to a length of 1000 words with suitable illustration material. Smaller news items should not exceed 500 words in length. Notices for upcoming events should be submitted in a timely fashion keeping in mind the semi-annual publication schedule of the *Courier*.

Although the editors will usually consult with contributors regarding any significant change to material submitted, the *TISP Canada Courier* reserves the right to publish such material with any change(s) necessary to meet space requirements, or as otherwise deemed necessary.

This electronic newsletter is issued quarterly by TISP Canada of IEEE Region 7. Current issues and back issues are freely available and may be retrieved at ***www.tisp.ieee.ca/publications.html***.

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The editorial content of this newsletter does not represent official positions of the IEEE or its organizational units.

IEEE and TISP

The Teacher In-Service Program provides a forum for IEEE volunteers to demonstrate engineering, science and mathematics concepts by sharing their real-world experiences with local pre-university educators. IEEE offers workshops for its volunteers on how to provide in-service programs.

Part of the IEEE mandate is to address declining interest of students in engineering. IEEE needs to help raise everybody's awareness of technology. The "TryEngineering" initiative involves IEEE, IBM and the New York Hall of Science. To-date, ***TryEngineering.org*** lesson plans have been downloaded more than 15 million times. The site has various great features, including a search for accredited university and college programs in many countries, including Canada. Portals on ***TryComputing.org*** and ***TryNano.org*** have also been launched.

More information is available at ***www.ieee.org/education_careers/education/preuniversity/tisp***