

Case Study and Discussion:

### Bringing Open Lab Science Courses to Life

..... (or not) 

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**Abstract:**

This discussion will begin with a light hearted case study of the introduction of web-based lab science courses and the Remote Web-based Science Laboratory (RWSL) in particular here in BC. It will review the successes that occurred due to the open nature of our work and the use of Creative Commons licensing and some of the not-so-successes in this saga due to a failure to engage science faculty. We will discuss our latest effort to increase faculty awareness and (hopefully) engagement through a survey that will ask faculty to try out RWSL and then submit a survey. The session will conclude with an open discussion of things we need to be cognizant of when introducing new educational technologies in general. Is there a best way to introduce them and if so what is it? What is required for successful implementation? (This discussion will be coupled with the RWSL Poster session later in the day.)

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The Question is ... 

*"When you come across or develop a new educational technology that offers significant improvement in the way we teach and the audience we can reach ...*

*... How do you introduce it in a way that will maximize its uptake and use?"*



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## Case Study:



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**What is RWSL?**  
RWSL = Remote Web-based Science Laboratory

RWSL is a software and robotic interface that allows students to interact with real lab equipment remotely in real-time to collect authentic real-world data.

... very brief history ...

- Tatla Lake On-line Observatory
- Web-based Associate of Science Project (WASc)
- RWSL

Partnership:  
Two of our partners were  
College of the Rockies  
Kwantlen Polytechnic University



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**Distance and on-line Labs before RWSL:**

"Kitchen" Science Labs

OLA Science courses  
(Students traveled to do f2f labs)

NIC PHY 060 (Labs: kit based)

NIC SSA 100/101 (loaned equipment, observation labs, interpretation of spacecraft data, software familiarization, on-line observatory)

You can try an RWSL lab right here at ETUG during the poster session this afternoon.

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We had a great idea!  
Entirely on-line science courses including the labs!

Everyone would see the sense of it and would want to implement on-line lab science courses as soon as possible ... , Why, wouldn't they?

First, RWSL is cool!

Implementing web-based science courses would increase enrollments because the audience would be significantly larger!

It's very cool!

Faculty would want to secure their jobs particularly in small institutions by being able to attract more students as indicated above.

RWSL is so cool!

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RWSL and web-based courses are designed to meet the same learning outcomes as f2f courses and labs.

Because we can.

And did we mention ...  
..... It's very, very cool?



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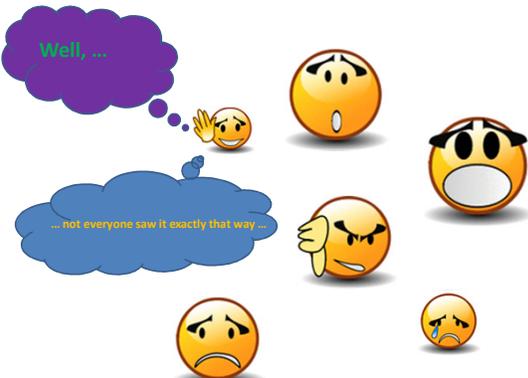
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What?

... not everyone saw it exactly that way ...



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The idea of entirely on-line lab-science courses and their required labs did strike a positive chord with funders and we were able to get funding for the WASc project 3 years in a row.

They thought it was cool!

The WASc project was created to build entirely web-based lab-science courses to support the associate of science degree and with it our efforts to build RWSL.



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**Early efforts and results:**

Originally RWSL labs were coupled with entirely on-line course curriculum.

Hmmm ...  
This may have been a case of trying to change too much all at once

But from small remote Bella Coola (where everything has to be delivered at a distance) this didn't seem like too big a change.

The various course curricula we developed were mostly not adopted by faculty in spite of the advantages we thought were so evident.

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Slow uptake is not due to technological issues, but more due to perception and resistance to change.

**Possible reasons may include:**

- Lack of a faculty champions  
Faculty members who are enthusiastic about on-line teaching and are willing to try the web-based curriculum in their own teaching.  
In one case the faculty champion left for personal reasons before the course ran.
- ... no champion!  
Other times the faculty who wrote the curriculum did the work, but wouldn't use it in their own teaching.
- Administration supported the initial project, but didn't encourage faculty to use this work until much later.  
... no champions here either.
- This is now happening.

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**Possible Reasons Faculty won't support web-based curricula:**

- Concern that students who do remote labs will not receive transfer credit ... even though they would be meeting the same learning outcomes?
- Concern that RWSL somehow threatens faculty and lab tech jobs
- Concern that RWSL will sap FTE away from F2F labs as students misguidedly see RWSL as the easier option.
- Untested perception that on-line curricula (and labs in particular) are somehow inferior to traditional F2F versions
- Concern that it will be more work for instructors than traditional F2F labs and courses coupled with an unwillingness to put the 'extra' work in that would be required to prepare and run an entirely on-line course
- Tenacious old views that Science (and particularly the labs) can only be taught in a face-to-face mode in spite of mounting evidence to the contrary.

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There has been some limited use of parts of the web-based lab course curriculum and RWSL:

The Geology course developed at COTR did run for several semesters. (entirely Lab kits)

The e/m lab was used with KPU students.

NIC's f2f physics class used the e/m lab the past 2 winter semesters (2012 & 2013).

The RWSL Spectrometer Lab has been adapted for use by NIC's SSA courses.

The Microscope lab was used by NIC's F2F biology instructor in winter 2012 and there are plans to use it again in the fall of 2013.

The "Remote Science Labs for Second Year Physics" project is making use of existing RWSL labs (with some tweaking).

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So we had a question: What are the generally accepted criteria that lab exercises in BC are built to?

We reasoned: If remote labs met those same criteria, then they should be acceptable.

To answer this a 2 phase project was Proposed and Bccampus funded the first phase.

With Bccampus funding we hired Dr. Penny LaCoutre to study this.

One result was that there are no generally accepted criteria in BC!

Dr. LeCoutre did propose a set of province wide lab exercise criteria, but follow-on funding was not forthcoming so the conference on this topic never occurred.

Hmmmm, how do you build remote lab exercises to meet the non-existent criteria that f2f labs must meet?! :-/

So ...

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So BC has not adopted the web-based curriculum or RWSL to any large extent yet.

There are positive signals and apparently a lot of interest so this should change ...

... soon, hopefully.

... and RWSL IS COOL!!!

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... and outside BC ....



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All WASC deliverables including RWSL are licensed under a Creative Commons license.

As a result, WASC curriculum and RWSL were picked up by the NANSLO consortium with funding from Next Generation Learning Challenge (Gates and Hewlett foundations)

They think it's cool!

WASC produced web-based curriculum was reviewed by the NANSLO discipline panels and adapted to meet Colorado State curriculum.

An RWSL Node with 3 RWSL units was established in Denver.

They have now successfully delivered over 1000 RWSL labs to students!



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In addition:

Several studies now indicate that students who do remote lab exercises do no worse than students who do face-to-face lab exercises.

**Kwantlen Polytechnic University**  
Jill Lang: "... There were no significant differences between the performance of the two groups with respect to graded lab work. ..."  
Lang, J., 2012, Transformative Dialogues: Teaching and Learning Journal, vol. 6, no. 1.

**September 2012, the Colorado Department of Higher Education**  
Rhonda Epper: "... The study suggests that students who took online science courses at the community college level perform just as well in science classes at four-year institutions as students who took traditional on-campus science classes."  
<http://wcat.wiche.edu/wcet/docs/blog/1622CCCSOnlinevsTraditionalScienceStudyReportJune2012update.docx>



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and

The NANSLO CHEO grant will construct a new RWSL node at University of Montana and expand the NIC node to serve remote health science labs to Anchorage, Alaska.

But no concrete general plans exist to utilize web-based science courses or RWSL labs here in BC ... yet.

Hmmm.....

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To make Remote labs more accessible to faculty:

RWSL labs now de-coupled from entirely on-line course curriculum so that f2f instructors can try one or 2 in their f2f courses without changing the entire course.

... not as grand as our original vision ...

The Remote labs for 2nd Year Physics project makes use of existing RWSL labs and will make it possible for small institutions to collaborate on some labs.

Instructors can write their own curriculum for RWSL labs.

BC and NANSLO February Meetings resulted in a number of things that we need to do. (this is an incomplete list):

- i. A "bazaar" or brochure for remote labs. (started)
- ii. BCcampus should engage in an Open Lab initiative
- iii. Faculty RWSL Sandbox (is part of the CHEO project)

An annual or biannual Remote Lab Conference.

Upcoming survey planned.

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Some Conclusions ...

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So what does this all tell us?

A couple lessons we might draw from this experience ...

New ed-tech requires active and on-going administrative support from the get-go.

New ed-tech requires one or more faculty champions who actually want to use the new technology in their own teaching.

We need the physical infrastructure made widely available to would-be users. Right now, it's a chicken vs egg thing in BC.

You mean ... Perhaps, just maybe cool is not enough?

What? Sacrilege!

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Open discussion about introducing ed-tech

What have we learned?

You think it's cool don't you?

How could we do it differently 'next time'?

... and just "... how do you introduce new educational technologies in a way that will maximize its uptake and use?"

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End Presentation

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