NANSLO

NORTH AMERICAN NETWORK OF SCIENCE LABS ONLINE

NANSLO Remote Web-Based Science Labs: Real Science in Real Time

Click here to watch the webinar recording

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GREAT FALLS COLLEGE MONTANA STATE UNIVERSITY

NORTH ISLAND COLLEGE

WICHE Western Interstate Commission for Higher Education

Presenters

Brenda Canine
Lab Manger and Instructional Designer, Great Falls College Montana State University in Great Falls Montana.

Mr. Robert Ehrmann
Managing Director, NACK Network

Michael Lesiecki,
Director, MATEC
Maricopa Community College District

Objectives

- Introduction to NANSLO
- Demonstrate NANSLO
- Student Data & Feedback
- Contact Information

What is a Remote Science Teaching Lab?

- A physical location where **real** laboratory equipment resides.
- The equipment is controlled with a computer over the Internet.
- Control can be either real-time or by batch submission of parameters.

REMOTE LABORATORIES | TRADITIONAL LABORATORIES | HOME KITS | VIRTUAL SIMULATIONS

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eScience Labs

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HANDS-ON LEARNING

late nite labs

NANSLO—Our Remote Teaching Laboratory

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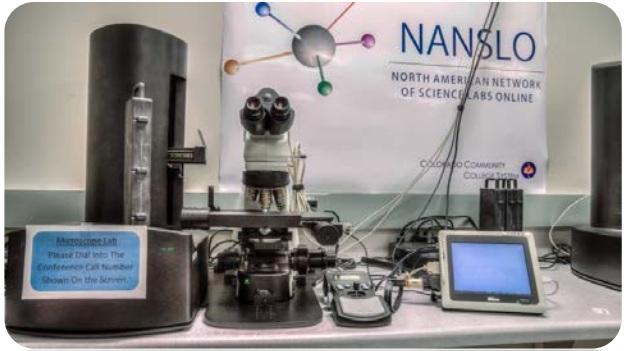

- **Consortium approach …**
- Working together to create quality lab activities
- Leveraging the knowledge of multiple experts for quick deployment of activities
- Optimizing the use of capital
- Utilizing high-end scientific equipment
- Reducing the bottlenecks experienced at f2f labs
- Expanding access to STEM courses for underserved and rural student populations
- Providing remote access to laboratories via the Internet to serve the ever increasing online student population

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NANSLO Labs

NANSLO currently has two laboratories:

Great Falls College
Montana State University
(Montana Lab)

North Island College
(British Columbia Lab)

NANSLO Goals

Make real scientific laboratory equipment available to students over the Internet

- Enable scientific experimentation with that equipment
- Maximize equipment utilization ratio
- Create inquiry-based laboratory procedures for use with this equipment

Enable multiple institutions to share laboratory equipment through a cooperative network

- Useful for remote/rural institutions and students
- Potentially useful for physically disabled students
- Distributed network = more durable

REAL Equipment

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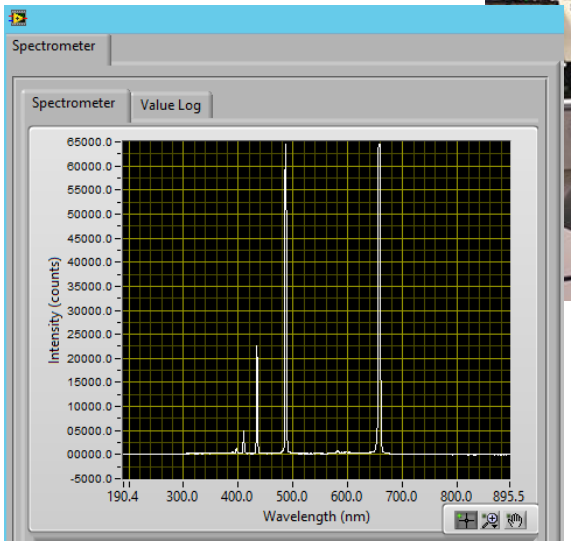
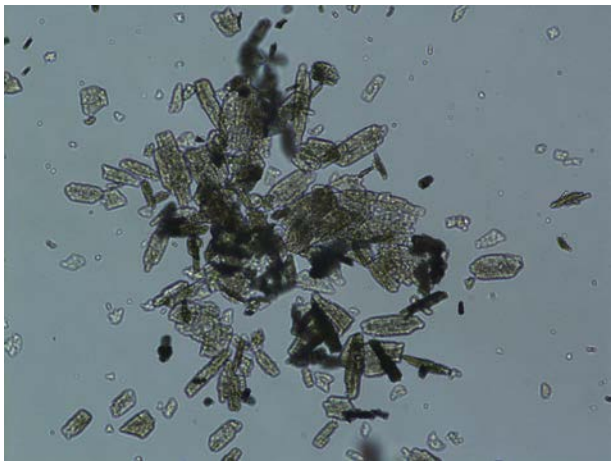


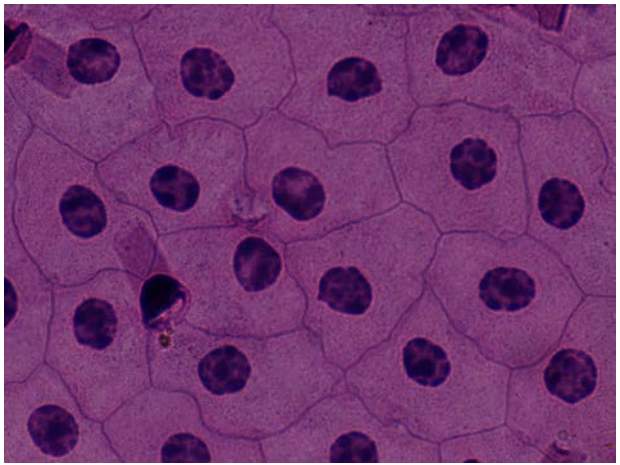
REAL Data

REAL People

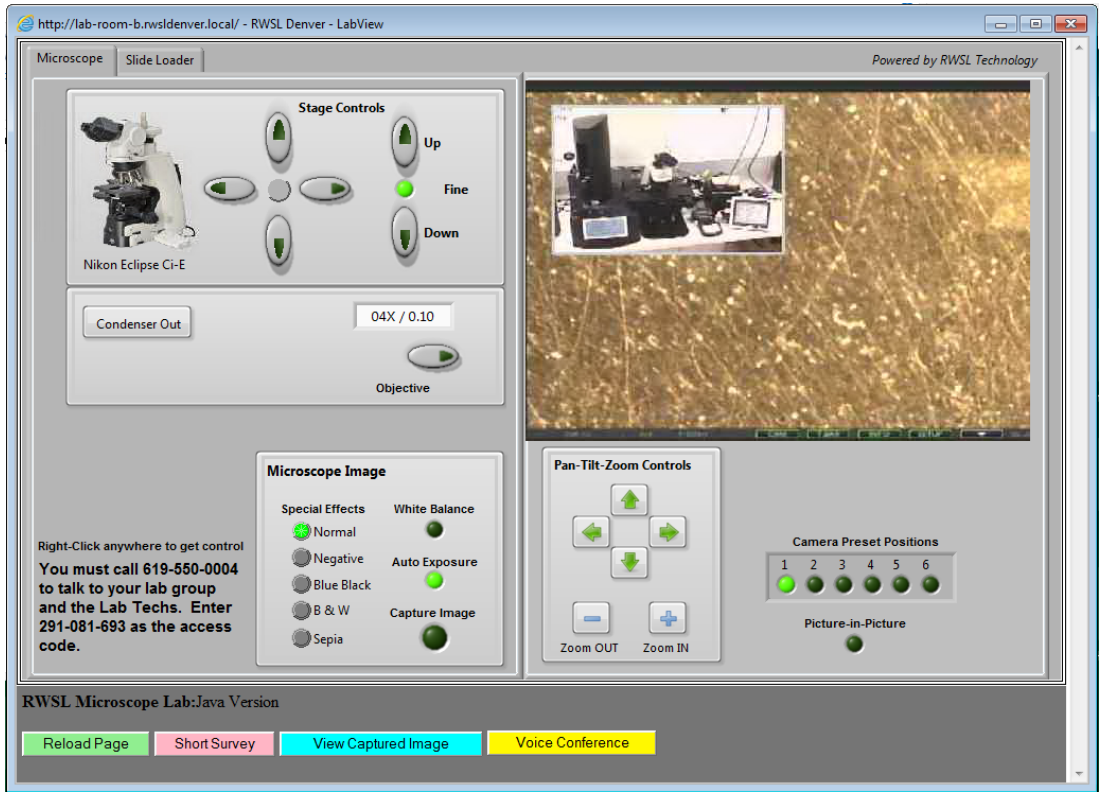
Question Break

Up Next Live Demonstration of a NANSLO Lab



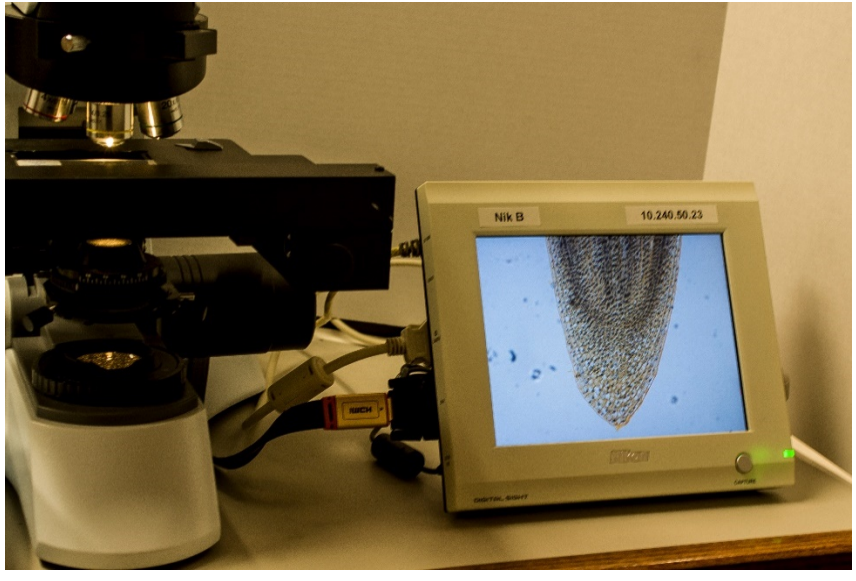


Microscope Experiment Interface

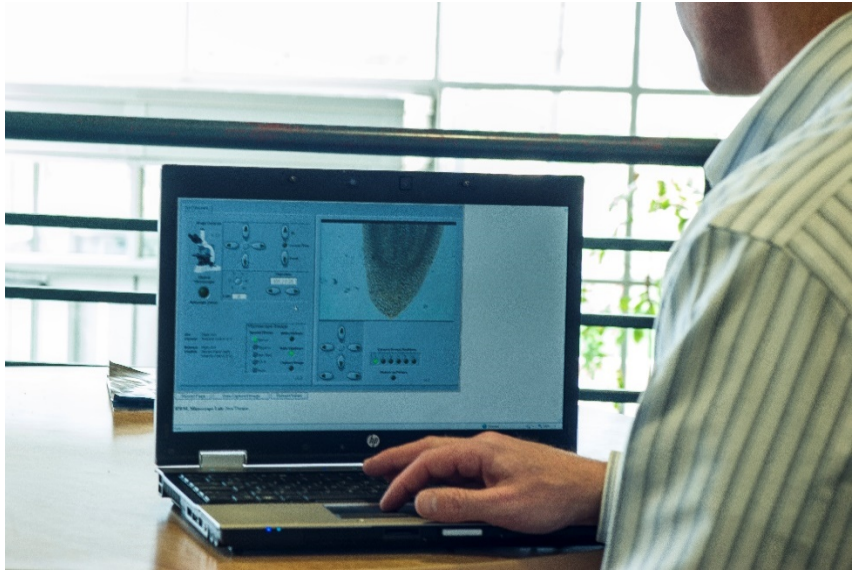


Students see the Same Information Remotely as They Do in the Lab

In the NANSLO Lab



Remote Connection



Live Demonstration

Major pieces of Equipment:

JAZ UV/VIS Ocean Optics Spectrometer

Nikon Eclipse CE Microscopes

Vernier Mini GC

NANSLO Lab Activities

Biology

- Introduction to Microscopy
- Mitosis & Meiosis
- Buffers
- Diseased Cells
- Membrane Diffusion
- Membrane Osmosis
- Hematology
- Histology – Epithelial
- Histology – Connective
- Histology – Neuronal
- Histology – muscle
- Cell Types – Domains of Life
- Parasitology
- Infectious Prokaryote, Protista, and Fungi
- Photosynthesis*
- Enzyme Kinetics

Chemistry

- Acid Base Titration
- Emission Spectroscopy
- Beer-Lambert Law
- Gas Chromatography
- Enzyme Kinetics
- Alpha, Beta and Gamma Radiation*

Physics

- Accelerated Motion
- Uniform Motion
- Conservation of Momentum
- Speed of Light
- Reflection and Diffraction

- These activities are under development
- # Available from BC lab

Question Break

Up Next: Student Experiences & Feedback

Logistics for Faculty and Student Experience

Instructor reserves time for lab activity based on number of students

Students receive an email with a link and a pin number for the specific activity

Students create accounts and reserve a block of time that works for them.

Prior to the scheduled lab time students complete pre-lab exercises and watch an introductory video on how to use the interface

At the scheduled lab time students log in and work collaboratively to collect data with their lab groups

Students complete data analysis and turn in lab to instructor-Instructor can also access usage reports

Student Lab Usage Data

	2012		2013			2014			
	Summer	Fall	Spring	Summer	Fall	Spring	Summer	Fall	Total#
Biology	53	99	144	NA+	NA+	289	141	375	1101
Chemistry	55	23	54	NA+	NA+	87	72	108	399
Physics	32	54	31	NA+	NA+	182	66	160	525

+ The NANSLO lab was closed for upgrades and relocation.

Can have up to 20* students per hour logged in simultaneously
So if 2 hour lab then 240/day → 1680/week

Capacity to expand

Student Usage

-Lab hours are Noon- 8 pm MST (other hours available if requested)

-Monday thru Saturday

-Lab sessions are 1-3 hours long with most labs being 2 hr blocks

-Up to 5 students can be on a piece of equipment simultaneously working in groups *

→ Our most popular times are 4-6 pm with Friday and Saturday's being the most popular days

* Self imposed limit to ensure student engagement

Student Reviews & Impact

What a great resource, it was way easier to use and much cheaper than buying the microscope for my class

Student, Flathead Valley Community College (Montana)

This type of unique 'hands on' experience taps into parts of the brain that even person-person labs miss.

Student, Kenai Peninsula College University of Alaska Anchorage

We took turns to do all four exercises by ourselves and it was very challenging and interesting but we did it. We were able to do microscopic examinations, analyze and observe. At the end we photographed the tissues.

Student – Consortium for Healthcare Education Online (CHEO) Initiative

The experience was more than satisfying and we [the student and her lab partners] were extremely pleased to be able to do this remote lab activity.

Student – Consortium for Healthcare Education Online (CHEO) Initiative

Overall Feedback

Do you have any other feedback on your lab experience? If yes, please enter below. (N = 108 Spring 2014)

- 81 75% were positive
- 46 43% were about the lab techs

Having the laboratory technicians is important to the students—many unsolicited comments about the lab techs presence even though they did not interact or have to adjust anything

Lessons Learned—Read Student Feedback Carefully

Student 1

"It was not clear on how to actually work the lab once I logged on and began. there were no clear steps or beginning points or good help options."

- Did you read the Pre-assignment material prior to access the lab?
    - Yes
    - Did you watch the NANSLO videos prior to access the lab?
    - **No**

Read Carefully and Adjust if Necessary

Student 2

"It was hard to find where the release control option was, the absorbance spectrum kept moving and so it was hard to find an exact value (we ended up rounding to 2 digits), and trying to figure out who had control was confusing."

- Did you read the Pre-assignment material prior to access the lab?
    - Yes
- Did you use the conference line during the lab?
    - **No**

We followed up with lab tech and did end up changing the position of the request and release control button to make it more obvious

Usage fee model– What does it cost to use?

$10/student/ lab

Several pay models- Institutional, Student Fee, Student access code

-Invoicing system built into our scheduling software- we work with what fits your institutional model

Summary

- Remote laboratories are a great new way to deliver science labs
- It gives access to high-end equipment using the flexibility offered in online delivery
- It is affordable both to students and institutions
- Students love it and early studies indicate its efficacy

Bring Remote Laboratories to Your Institution

1. Contact us! Let us know what your needs are

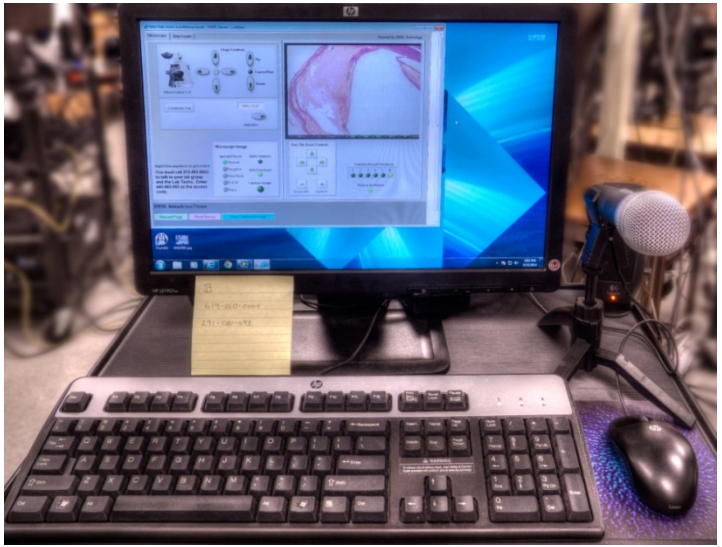
   Brenda.canine@gfcmsu.edu

   406-771-4435

2. Hands on Demo

3. Contract or MOU for Pilot

4. Pilot implementation



Schedule your demo

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NANSLO website http://www.wiche.edu/nanslo

http://elearning.gfcmsu.edu/nanslo

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