Until we can all get back to the lab…

Before we get started

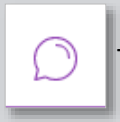
Open **Collaborate Panel** to view session options (bottom right of screen)

Click **Settings** to edit options (e.g., disable pop-up notifications)

Let us know if you can hear us when we do **Audio checks**

During the webinar

Your **microphone** will be muted until Q&A at end of session



Type questions and comments into the **Chat**

Close **Collaborate Panel** to stop viewing incoming chat posts

GOALS

- Build community awareness of virtual labs and lab alternatives
- Identify common challenges to engaging students online in lab work/lab training
- Explore solutions and applied tips and strategies for engaging students in online lab scenarios and solutions
- Navigate and utilize support resources

AGENDA

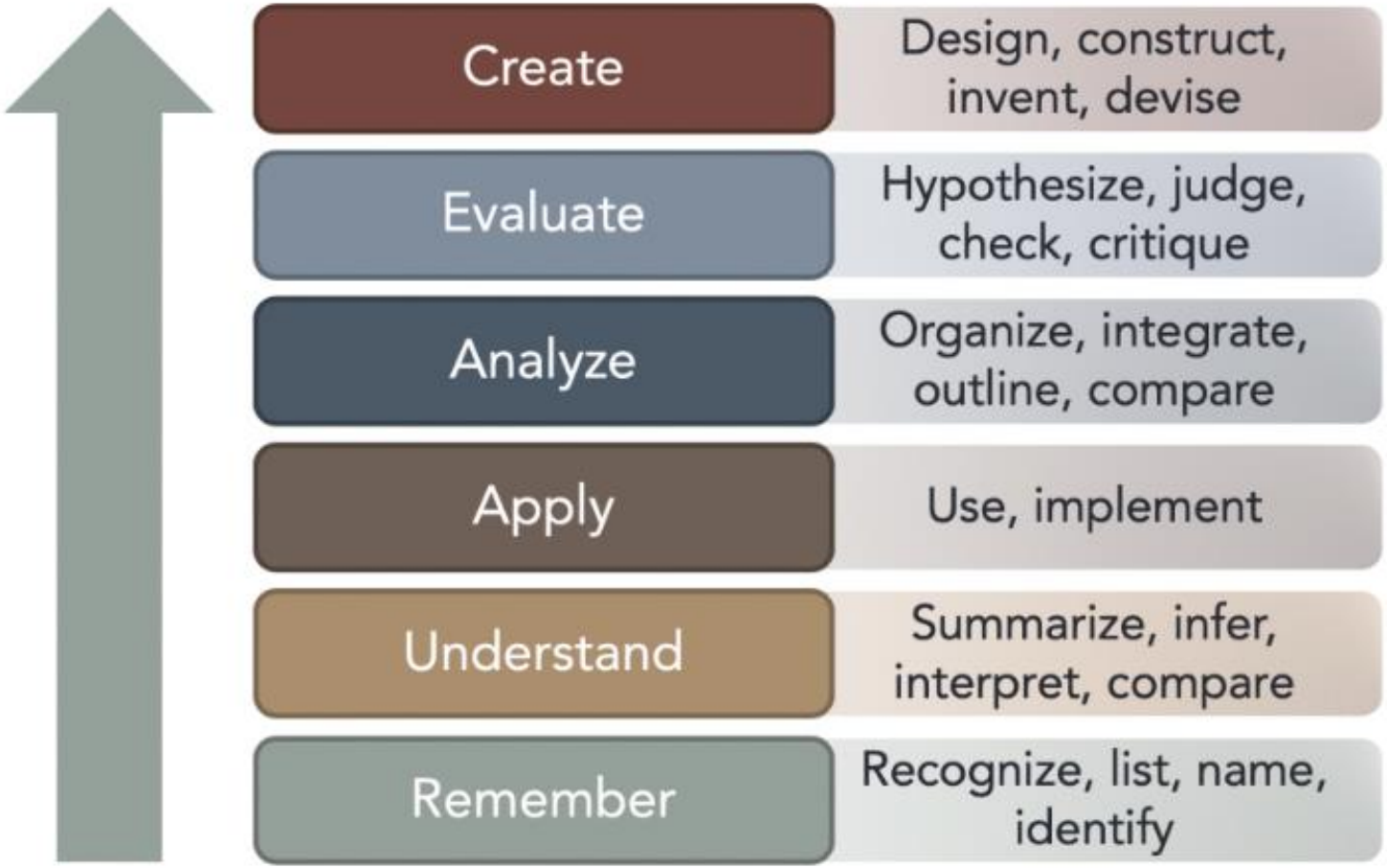
1. Introductions
2. Setting the stage
3. Panelists
4. Q&A and Barrier Busting
5. Navigating Support Resources

Introduction

Setting the stage through the design process:

1. Focus on the most important learning outcomes for your students.
2. Align learning outcomes with assessments.
3. Identify activity steps in each week/module to build student skills and support success in assessments.

Higher Order Thinking Skills



Anderson & Krathwohl (2001)

Lab Alternatives

Adapt

Use open source materials available at no cost.

Many high–quality lab simulations and online interactive learning objects are available to be embedded or linked through Quercus course shells.

License

License rich content that includes online labs and formative assessment

Available from publishers and other discipline-specific providers.

Create

Create your own labs or activity guides using simple video clips of lab protocols and accompanying data sets for analysis.

Use items found at home for simple observations and exploratory activities.


RIGHT WAY
Right Way
Right Way

Setting the Stage

As we move to fully online/distance teaching some questions instructors are asking include:

- What options are there for providing online labs and lab supplements?
- How effective are online labs and lab supplements?
- How do online labs work/what kind of experiences do they offer?

OUR PANELISTS

We have 3 panelists to speak to their experiences with online lab approaches:

- **Chris Garside**, Associate Professor, Teaching Stream, Cell & Systems Biology
- **Dawn Kilkenny**, Associate Professor, Teaching Stream, Institute of Biomaterials and Biomedical Engineering
- **Lana Mikhaylichenko**, Associate Professor, Teaching Stream, Chemistry, UTSC

Chris Garside - Introductory Animal Physiology I

- 2nd year, Animal Physiology Major Program
- 220 students (Fall); 72 students (Summer)
- Course Setup:
    - Weekly lecture (2 hr)
    - 2 Labs: each divided into a pre-lab and lab session
    - Experimental design (Lab 1) and Skeletal Muscle Contraction (Lab 2)
        - Collaborative practical skills with lab partners
        - Written lab assignments (Materials and Methods – Lab 1 and Introduction – Lab 2)

CHALLENGE

Outline of the biggest challenge to online design

- No in person labs therefore no hands-on practical experience
- How to provide necessary theoretical background for written lab assignments

What was the challenge faced?

- Design new online lab materials from scratch or available freely on the internet because we have not been permitted into the lab to film previous experiments
- Student engagement in an online environment and academic integrity

What was considered to solve the challenge?

- Online lab development TAs
- Focus on non-hands-on lab outcomes/objectives with non-googleable assignments

SOLUTION

- What did you do?
  - Hired two TAs as online lab development TAs (DJ Barua and Nadia Morson)
  - Case studies and simple at home experiments as preparation for written lab assignments
  - Created videos covering background/objectives of laboratories
  - Online prelab presentations and online TA office hours to provide a small-group 'lab'-like experience
- Tips and Strategies for success
  - Hire engaged lab development TAs
  - Focus on the theoretical rather than the practical components of laboratories
  - Keep practical at-home experiments simple with clearly defined outcomes
  - Modify existing lab manuals, assignments, and rubrics when possible
  - Clear and concise guidelines and directions for students and TAs

LESSONS LEARNED

Lessons learned about implemented solution

- What worked well?
  - Teamwork amongst engaged lab development TAs and course coordinator
  - Microsoft Teams group
    - Share and edit files

- What could use refinement (if anything)
  - Quercus organization
  - The summer session is our test run...we will see??

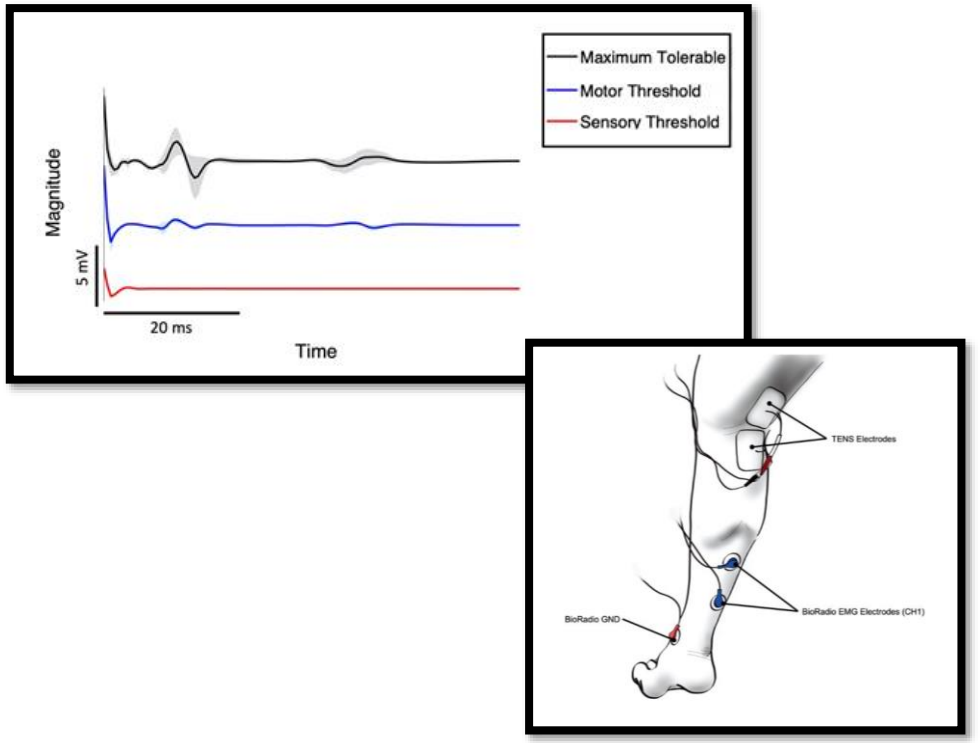
- Quote or Anecdote about intervention used
  - It's a lack of clarity that creates chaos and frustration.

Dawn Kilkenny -
Biomedical Systems Engineering I: Organ Systems

- 3rd year, Engineering Science, BSE program
- ~ 30 students
- Logistics:
  - weekly lecture (3 hr) and tutorial (1 hr)
  - bi-weekly lab sessions (5)
  - students are lab subjects
  - Collect self-data for analysis and translation to theory/comprehension of selected organ systems

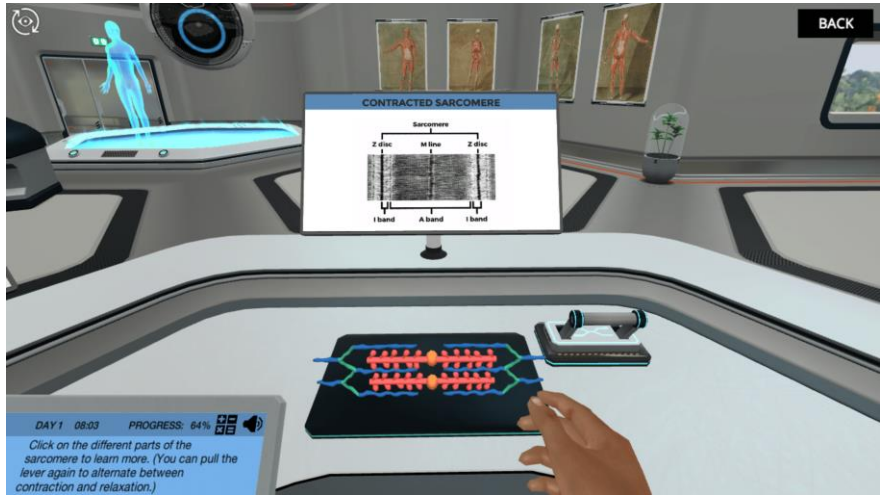
Kayes-Wandover, Human Physiology Study Guide

CHALLENGE



- The biggest challenge to online design:
  - Students are no longer the subjects of the labs
- What is the challenge faced?
  - Student interest, engagement, and preparation may decline
- What was/is being considered to solve the challenge?
  - Online methods of inquiry-based learning, including implementation of online demonstration videos & online simulations, supplemented with actual data

SOLUTION



- What did/will you do?
  - Incorporation of Labster virtual lab simulations
  - Supplement post-lab experience with data sets
  - Scaffold with relevant case studies for follow-up tutorial discussion/investigation

- Tips and Strategies for success
  - Ensure TAs have immersed in the simulations!
  - Ensure content aligns with course objectives

Labster; Muscle Tissues Simulation

LESSONS LEARNED

- What worked well?
  - Students navigate decisions in the workflow, and can go 'back & forth'
  - Integrated theoretical biology simulations allow complex responses to be visualized
  - Ability to consequently analyze data enhances student engagement

- What could use refinement
  - Immediate feedback from instructional team (TAs/instructor) not feasible
  - Some simulations contain irrelevant information

- Quote or Anecdote about intervention used
  - Although preferred as an in-person supplement, virtual labs can provide impactful learning when thoughtfully scaffolded within your curriculum.

Dr. Lana Mikhaylichenko - CHMC47H3 Bio-Organic Chemistry

- Normally around 100 students
- Factors for course success:
  - ➢ Good practical skills and knowledge in different techniques
  - ➢ Critical thinking skills and analysis
  - ➢ Good knowledge in different spectroscopy methods
  - ➢ Ability to use special chemistry programs (ChemDraw, MNova, etc.)

CHALLENGE

Outline of the biggest challenge to online design for success factor outlined in previous slide

Lab experiment should be video-recorded in real lab, online simulations will not serve the goal. Ten experiments need to be modified for the online delivery during this summer term

What was/is the challenge faced?

Find the appropriate resources and people who can contribute to the process

Find people who will have skills to video-record and edit these videos

What was/is being considered to solve the challenge?

Getting students who successfully finished this course last fall on a board

SOLUTION

Outline of the solution implemented or will implement to the challenge posed above

- What did/will you do?

Have six students from PSCB90H3 course currently working with me on a project. Two of them have all necessary skills for video project. All of them finished CHMC47H3 course last fall and have good knowledge of the lab techniques and course structure.

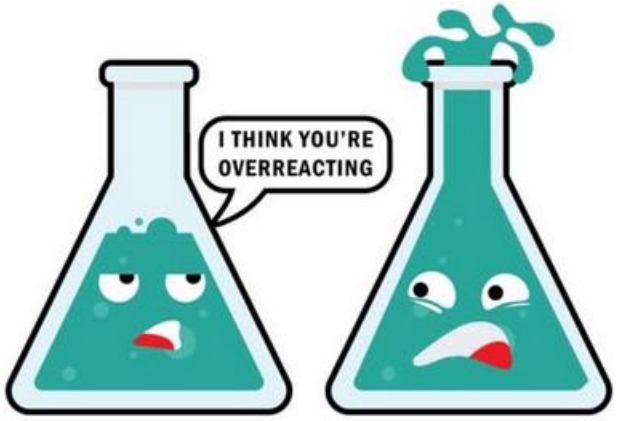
- Tips and Strategies for success

➢ Outline the process

➢ Prepare story boards for each experiment

➢ Have access to the lab for video-recording

LESSONS LEARNED



Lessons learned about implemented solution

- What worked well?

The theory part of the project is working well with different approaches (Microsoft forms, ppt) to make story boards for video project. Online lab quizzes are also almost finished and tested

- What could use refinement (if anything)

Need to get an access to labs to start video project

- Quote or Anecdote about intervention used

Nothing is impossible, the word itself says 'I'm possible'! Audrey Hepburn.

Specialized Support Resources

Virtual Labs for Remote/Online Courses:

https://onlinelearning.utoronto.ca/virtual-labs/

Virtual Lab and Science Resource Directory:

https://opentextbc.ca/virtualscienceresources/front-matter/using-this-directory/

General Support Resources

CTSI website: https://teaching.utoronto.ca

Upcoming events: https://teaching.utoronto.ca/events

Quercus Support Resources: https://uoft.me/qresources

Divisional Support: https://uoft.me/qsupportcontacts

Questions: q.help@utoronto.ca

Questions and Comments

Thank You