Virtual Labs: Labster Under The Lens

Before we get started

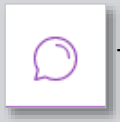
Open **Collaborate Panel** to view session options (bottom right of screen)

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

- Increase awareness of Labster as a virtual lab/simulation option at UofT
- Identify common challenges in integrating lab/simulation into course context
- Review tips and strategies for engaging students using Labster examples
- Share support resources for successful Labster integration and use

AGENDA

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


RIGHT WAY
Right Way
Right Way

Introduction - Lab Alternatives

Adapt	License	Create
Use open source materials available at no cost.	License rich content that includes online labs and formative assessment --> Labster	Create your own labs or activity guides with accompanying data sets.

Setting the stage for lab integration process:

- Focus on the most important/realistic learning outcomes for your students
- Link to grades/assessments to signal value and motivate students
- Provide a pedagogical "wrapper" that links to course content

Labster Availability at UofT

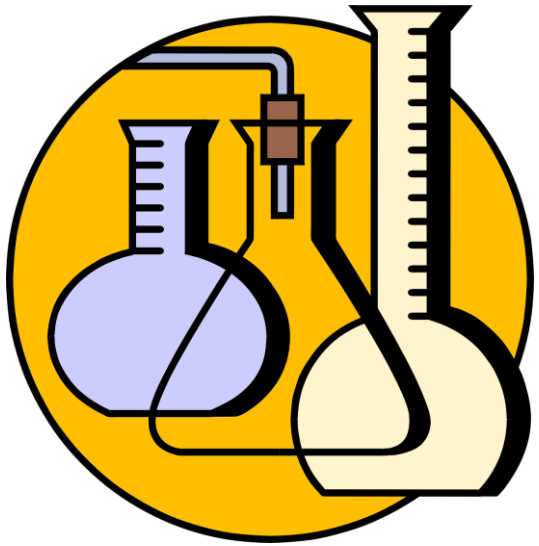
Labster licencing currently available at:

- UTSC – campus site licence
- UTM – Biology; Chemical and Physical Sciences

Fall 2020 pilot:

- Selected courses on St. George across multiple divisions.

--> future use may require advocacy/budget asks



Labster

Labster provides many kinds of virtual lab simulations, from simple 2D animations that can be viewed on a desktop, to advanced 3D experiences that can be viewed in immersive virtual reality headsets.

In Labster virtual lab simulations, students work through real-life case stories, interact with lab equipment, perform experiments and learn with theory and quiz questions.

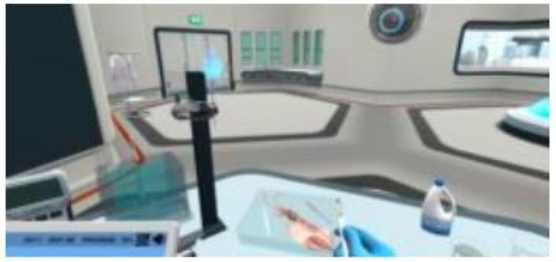
Students can explore life science at the molecular level and look inside the machines they are operating.

Catalogue

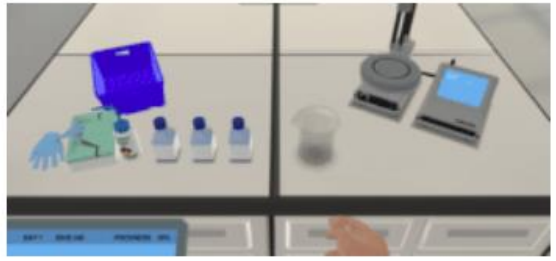
Labster Resources Pricing Simulations Blog Support

Acids and Bases

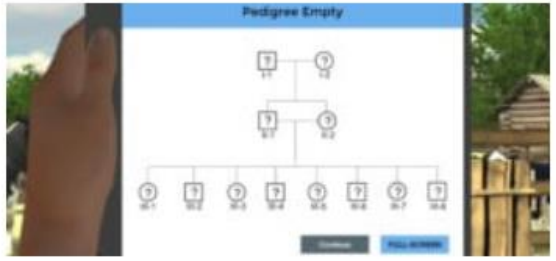
Acids and Bases (Principles): Avoid falling in a lake of acid!



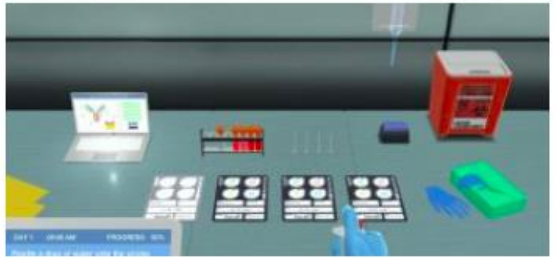
Action Potential Lab: Experiment with a squid neuron



Advanced Acids and Bases



Animal Genetics



Antibodies: Why are some blood types incompatible?

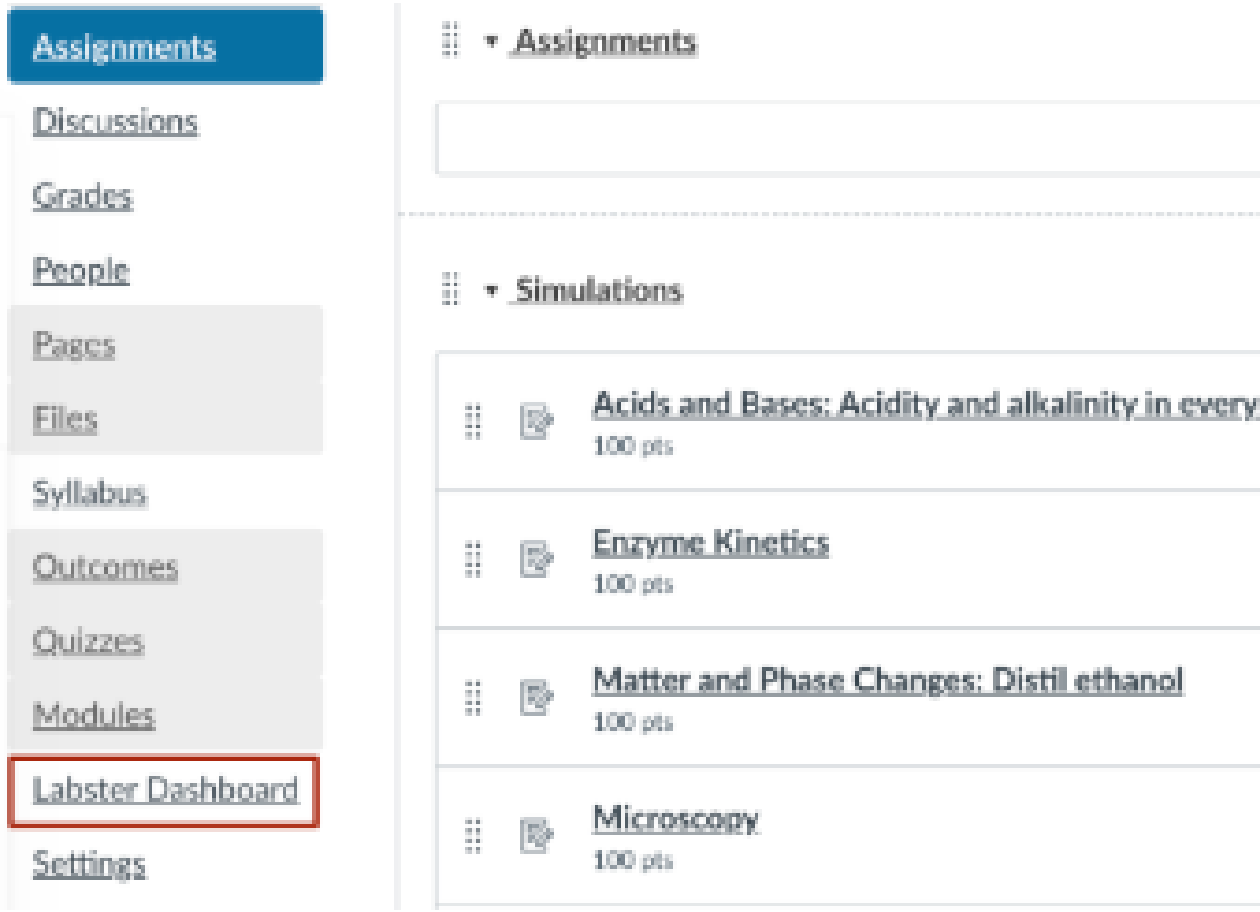
150+ Simulations

Integration

Labster is integrated into Quercus.

Integration includes:

- instructor dashboard to view student interactions and submissions
- grade "pass back" to the gradebook



OUR PANELISTS

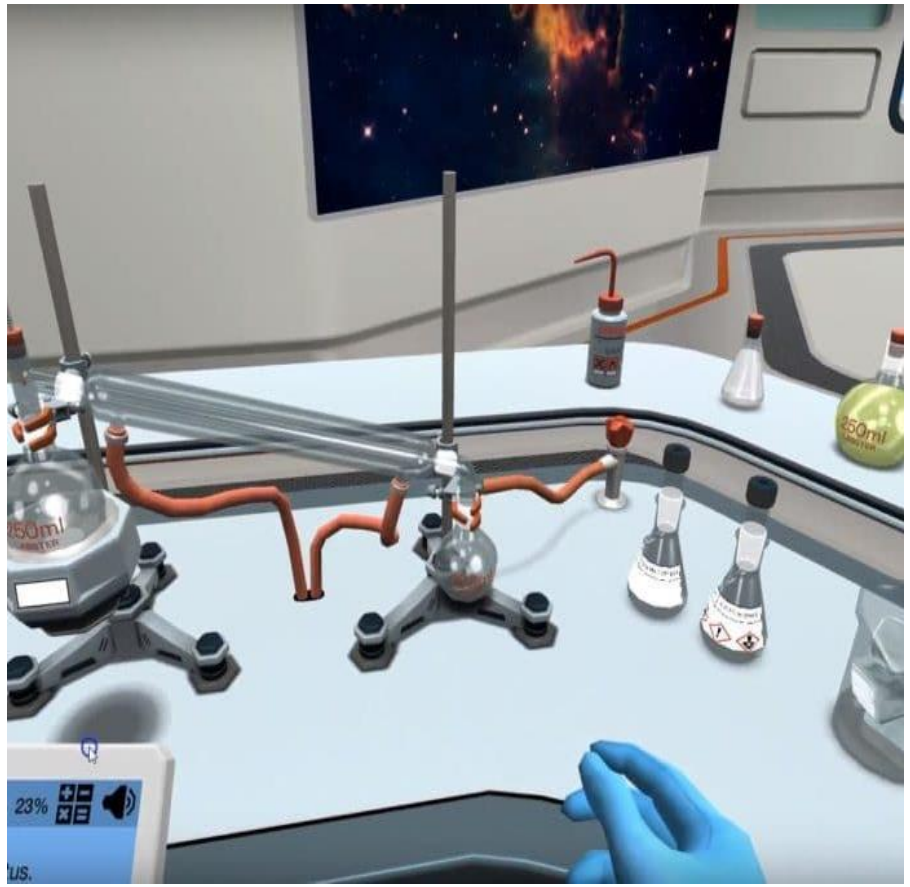
- Judith Poë, Professor, Teaching Stream, Department of Chemical & Physical Sciences, University of Toronto Mississauga
- Elizabeth Polvi, Course Coordinator, Introduction to Medical Microbiology, University of Toronto
- Tae Joon Yi, Lecturer, Department of Immunology, University of Toronto

LABSTER UNDER THE LENS

November 3, 2020

Judith Poë
Department of Chemical and Physical Sciences
University of Toronto Mississauga

CHM110H5F and CHM120H5S Chemical Principles 1 and 2



- ~800 students – fall
- ~650 students – spring
- largely 1st year students planning to major in life or physical sciences

- Success depends upon
  - ability to link macroscopic observations to microscopic explanations and symbolic representations
  - algebraic problem solving ability

CHALLENGES FACED in 2020–21

- Students' education in chemistry and mathematics was disrupted in the spring of 2020. Some topics were not taught; others were not learned.
- Fear of lower enrollments appears to have lead to lowered admissions requirements.
- Covid–19 made in–person practical classes impossible.

ADDRESSING PROBLEMS VIA REMOTE LEARNING

- Integrate laboratory and tutorial material in studio type classes.
- Provide videos of experiments allowing students to take measurements from real equipment.
- Incorporate 7 Labster simulations,
  3 in PRA classes, 4 as homework.

PROS

- Reinforces basic concepts
- Very good lab safety components
- Real world scenarios make the labs relevant
- Easy integration to LMS
- Students enjoy the video game environment

PROBLEMS

- Technical glitches
- Excessive bandwidth
- Occasionally next step is not clear
- A few errors in theory
- Idealized data; no errors
- Extraordinarily high marks

- …and for those who have no access to real labs, a virtual lab is better than no lab at all.

Nature 562 S5–S7 (2018)

Elizabeth Polvi

Course Coordinator, Introduction to Medical Microbiology, University of Toronto

COURSE INTRODUCTION:

Course:

- MGY277, Introduction to Medical Microbiology, Fall 2020
- Has always been an asynchronous online course

Students

- ~300 students this year

Factors for student success in the course:

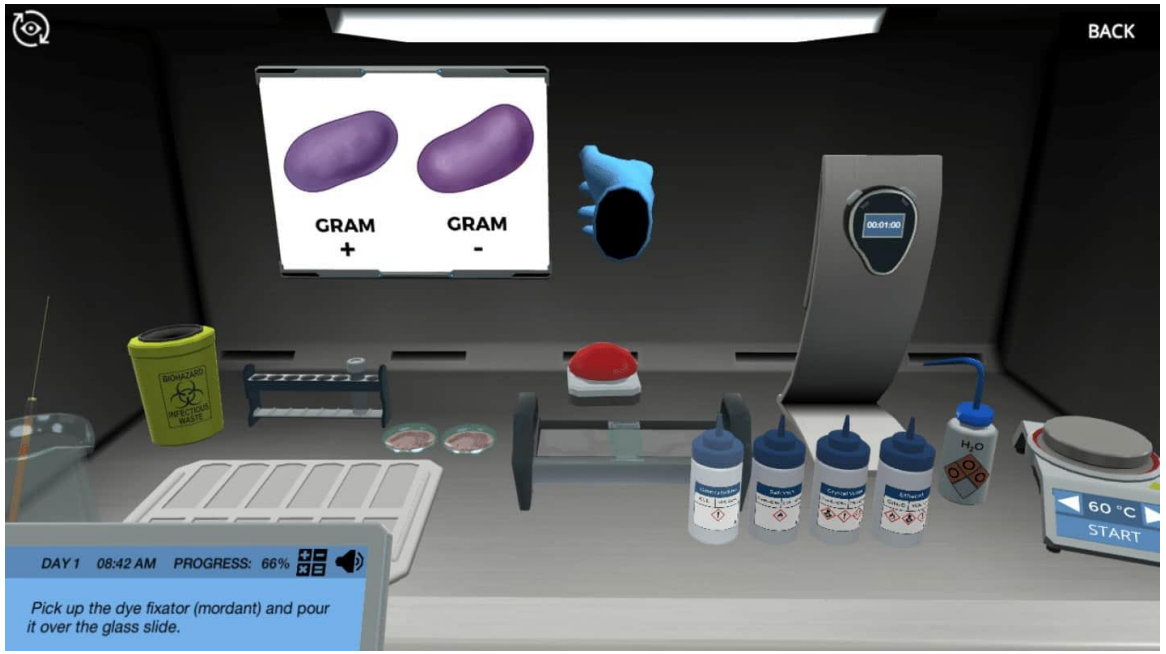
- Engagement and motivation

ESBL-producing Enterobacteriaceae
CDC (2020)

CHALLENGE: Increase student engagement and motivation in an asynchronous online microbiology course

Labster implementation:

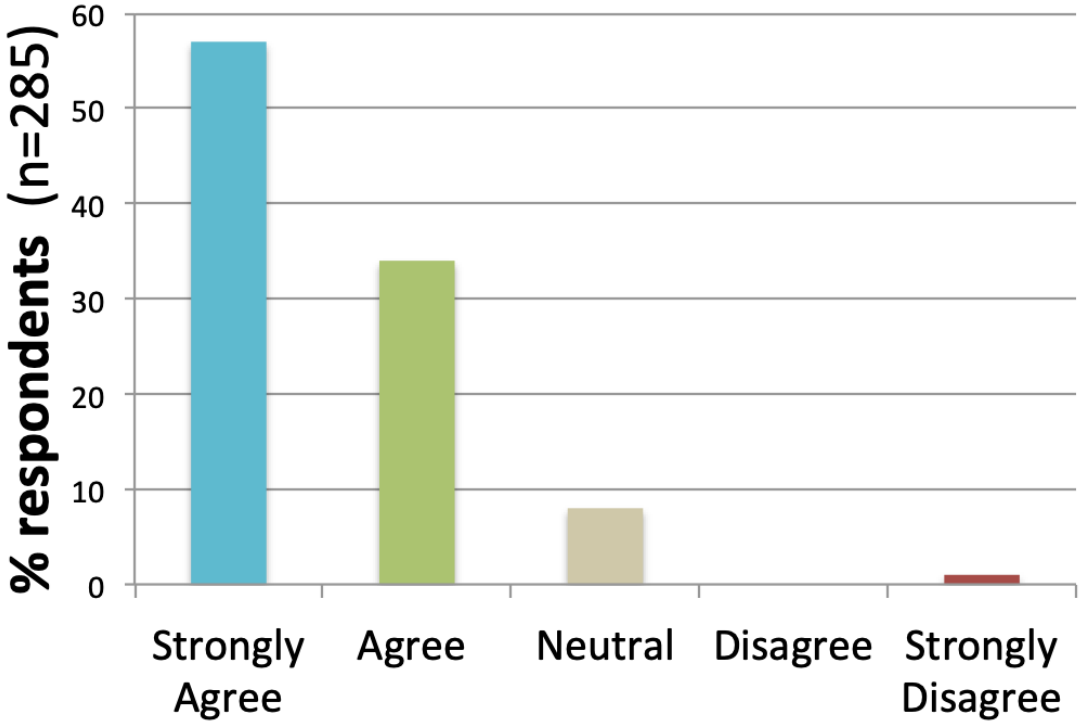
- Included two Labster simulations as course assignments
  - Each worth 5% of final grade
- Simulations complemented course material
  - **The Gram Stain**: Identify and differentiate bacteria
  - **Bacterial Cell Structures**: An introduction to the bacterial cell



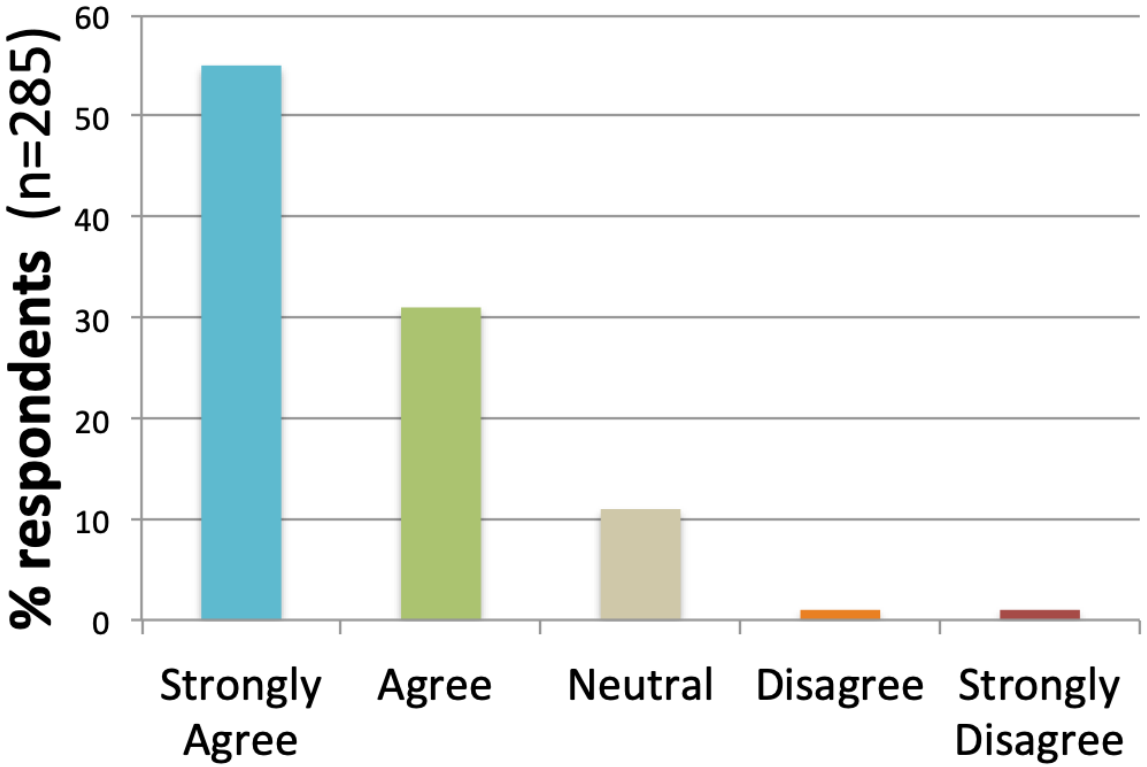
- Allowed ***multiple attempts*** for the first simulation (Kept high score)
- Kept ***first attempt*** for the second simulation

LESSONS LEARNED- What worked well

"I enjoyed the Labster simulations"



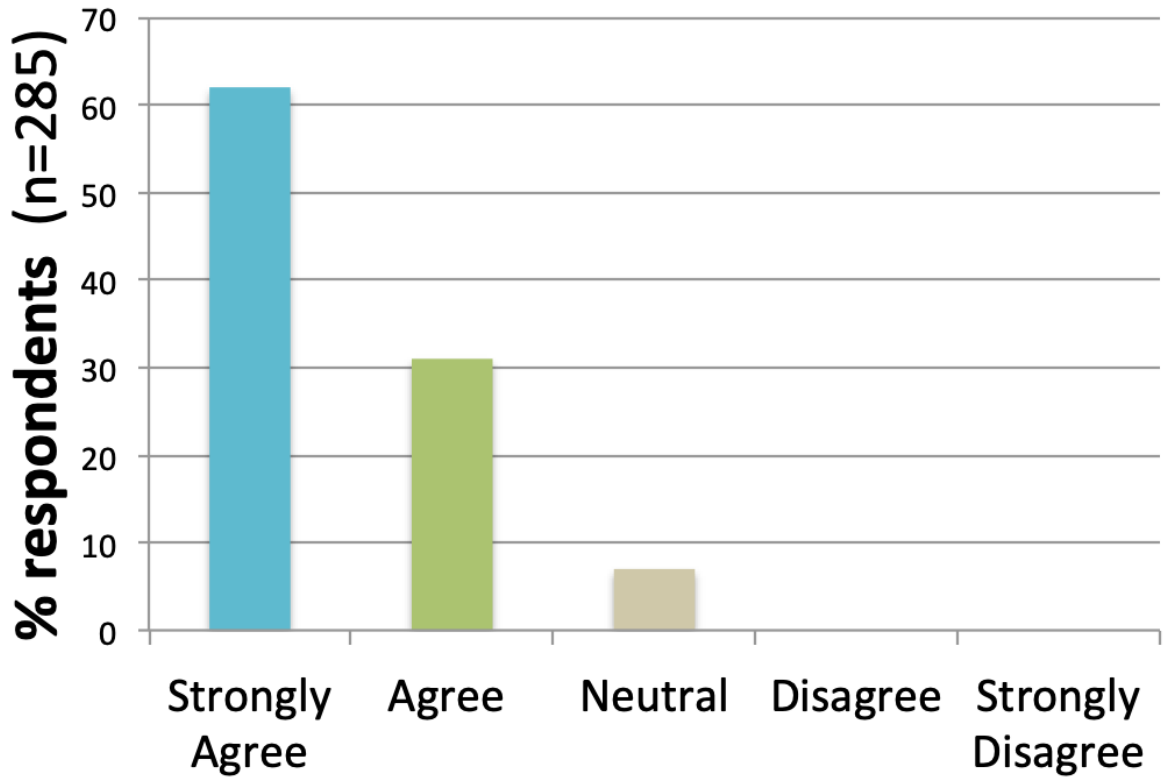
"I found the Labster simulations motivating"



- Over 85% of students enjoyed the simulations and found them motivating

LESSONS LEARNED- What worked well

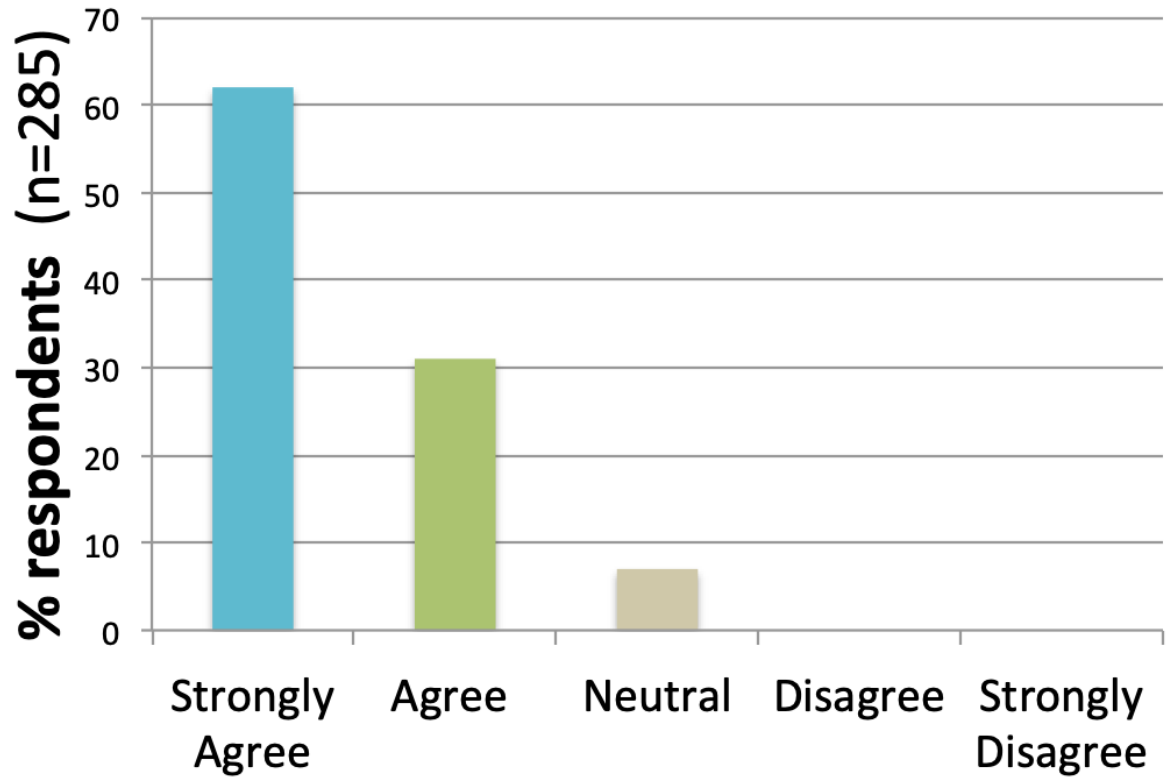
"The Labster simulations increased my understanding of course concepts"



- Simulations complemented the course material well
- 90% of students found they **increased understanding of course concepts**

LESSONS LEARNED- What worked well

"The Labster simulations increased my understanding of course concepts"

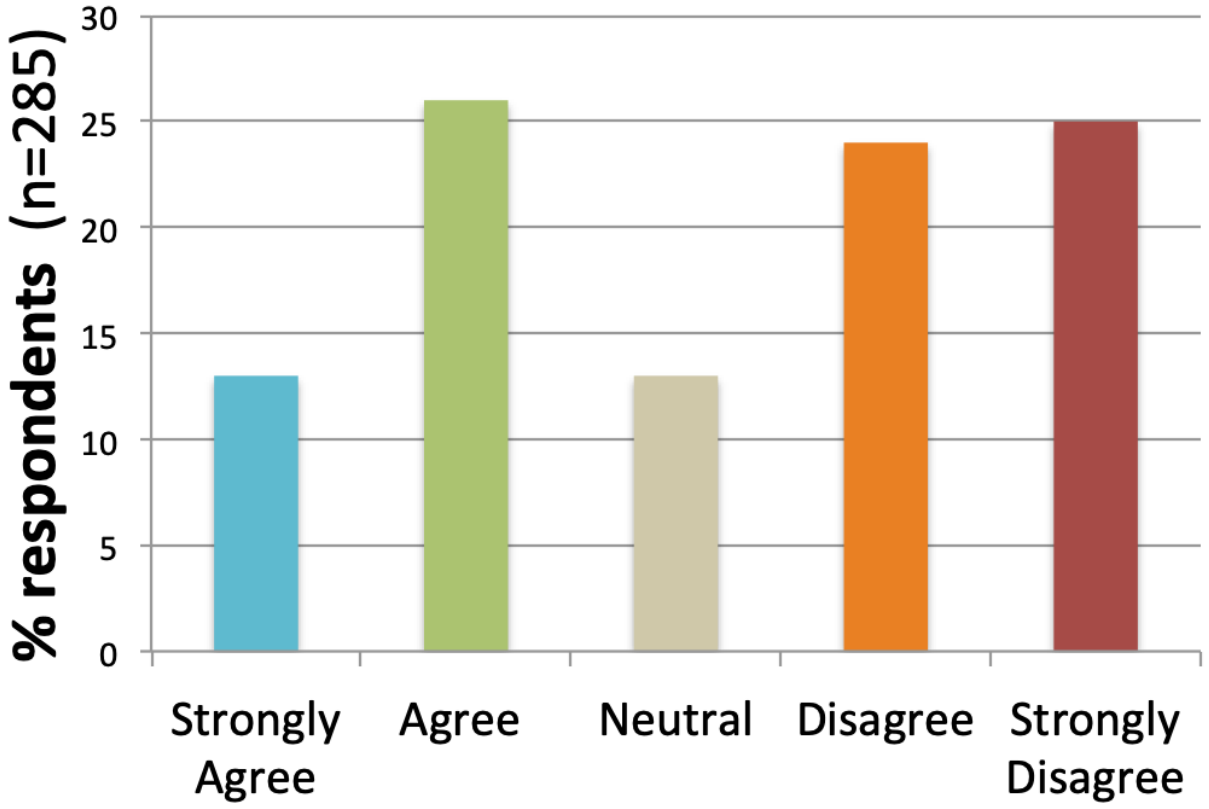


Student comments:

- 'Fun and different way to engage with the material'
- Enjoyed the 'video game aspect'
- A 'much needed break' from usual methods of testing
- 'Presented material in a different way'
- ***"If I had to choose my favourite feature from UofT this online year, it would be the Labster simulations."***

LESSONS LEARNED- Refine for next time

"I experienced technical issues or challenges when going through the Labster simulations"



- ~40% of students experienced technical issues

Common complaints:

- Lagging/freezing/crashing
- Laptop overheating
- Sometimes instructions in simulation were unclear (ex: where to place the test tube)

LESSONS LEARNED- Refine for next time

- **Use as participation marks**
  - Average grade was extremely high
  - Allow multiple attempts to accommodate technical issues

- **Setting up student expectations**
  - Progress is saved if re-start is required
  - Inform students ahead of time of approximate time commitment (~ 1 hour each)
  - Compatible only on a computer/laptop (not phone or tablet)

Tae Joon Yi

Lecturer, Department of Biology,
UTSC

COURSE INTRODUCTION

COURSE

- BIOC15, Genetics, 2020 Summer and Fall

- 90 students in the summer, 140 students in the fall

- Factors for student success in course
  - Creating an immersive experience that can complement the course material

Challenge

- BIOC15 – Genetics always had laboratory component

The big question: **How can we effectively replace an in-person lab component into an "online" experience?**

Interim Solution

- Let Labster take over the immersive experience but still provide a way for students to learn how to write lab reports

- Why participation? (100% completion and >70% on questions)
  - To focus on the immersive experience and not on answering what's "right"
    - Multiple attempts and take the highest score
  - The way Labster questions work

- Labster contents were tested as short answer questions in two term tests and a final

Labster participation	5%
Labster reflection	5%
Lab report	10%

Labster Feedback (n=66)

- Did you enjoy interacting with Labster simulations?
  - 4.07/5
- Overall, how would you rate your learning experience with Labster simulations?
  - 3.99/5
- In the future, would you prefer to learn via such online simulations or via in-person labs?
  - 13 online simulation, 33 combination of both, 19 in-person, 1 N/A
- Any technical difficulties?
  - 30/66 had technical difficulties

Changes from summer to fall

- It was hard to assess students' knowledge gained from Labster on term tests and finals
  - Create an assignment dedicated to Labster
  - Allocated a TA per module (5) - TA makes an application question
  - Students have one week to complete the assignment
  - Group work?

Labster participation	5%
Labster reflection	5%
Lab report	10%

Labster participation	5%
Labster assignment	20%
Lab report	15%

LESSONS LEARNED

- Finding relevant modules for your specific course
  - Content consultants – provide them with the syllabus and will pull up a list of relevant modules for your course
- Overall, many students were surprised by how advanced Labster is
  - One of the TAs comment – "I wish this was available when I was an undergrad"
- Striking the right balance between Labster modules and practical skills students can learn from your course (writing skills, teamwork and etc)

INTERESTED IN USING LABSTER?

Contact online.learning@utoronto.ca
to set up a consultation or demo.

- UTM and UTSC are covered through local licence through winter term
- Instructors in other divisions will need to seek funding or pass cost to students ($15 - $25 US per learner)

RESOURCES

Labster website

Labster and Quercus details

Virtual labs (including Labster) at UofT