

# Investigating equity across grades and affective outcomes in physics courses at Canadian post-secondary institutions

---

Canadian Association of Physicists Congress 2023

Jared Stang<sup>1</sup>, Aarthi Ashok<sup>2</sup>, Evelyn Asiedu<sup>3</sup>, Ariane Cantin<sup>1</sup>, Joss Ives<sup>4</sup>, Tamara Kelly<sup>5</sup>, Mindi Summers<sup>1</sup>, Jaclyn Stewart<sup>4</sup>

<sup>1</sup>University of Calgary    <sup>2</sup>University of Toronto    <sup>3</sup>Thompson Rivers University

<sup>4</sup>University of British Columbia    <sup>5</sup>York University

June 21, 2023

*I acknowledge the traditional territories of the people of the Treaty 7 region in Southern Alberta. The City of Calgary is also home to Métis Nation of Alberta, Region 3.*



UNIVERSITY OF  
CALGARY

# Canadian Consortium of Science Equity Scholars



THE UNIVERSITY OF BRITISH COLUMBIA



UNIVERSITY OF  
CALGARY

YORK 



UNIVERSITY OF  
TORONTO



THOMPSON RIVERS UNIVERSITY



[scienceequityscholars.ca](http://scienceequityscholars.ca)



Social Sciences and Humanities  
Research Council of Canada

Conseil de recherches en  
sciences humaines du Canada

CCSES



UNIVERSITY OF  
CALGARY

# Canadian Consortium of Science Equity Scholars



THE UNIVERSITY OF BRITISH COLUMBIA



**Jaclyn  
Stewart**



**Joss  
Ives**



**Liz  
Saville**



**Tamara  
Kelly**



UNIVERSITY OF  
TORONTO



**Aarthi  
Ashok**



**Trisha  
Mahtani**



THOMPSON RIVERS UNIVERSITY



UNIVERSITY OF  
CALGARY



**Ariane  
Cantin**



**Jared  
Stang**



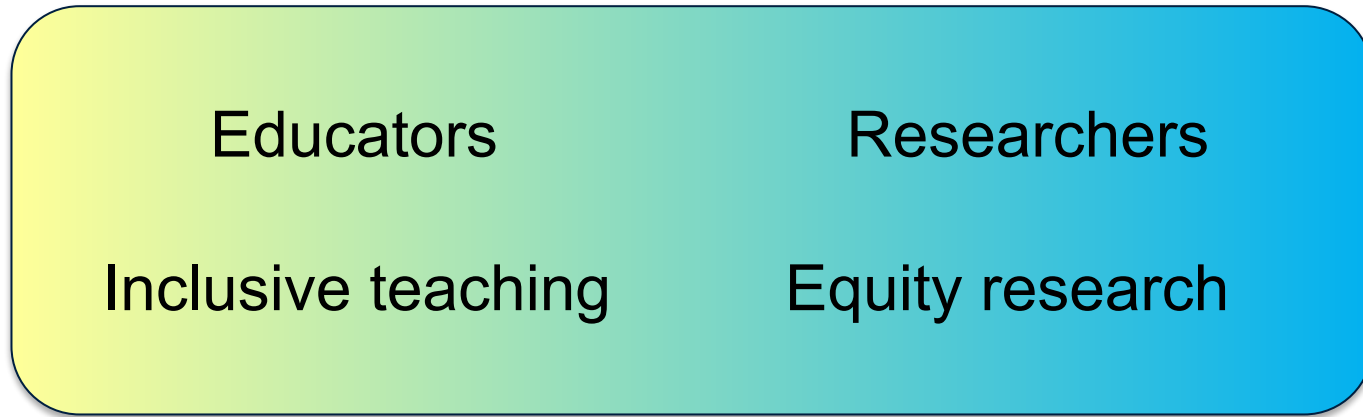
**Mindi  
Summers**

& more students  
and collaborators



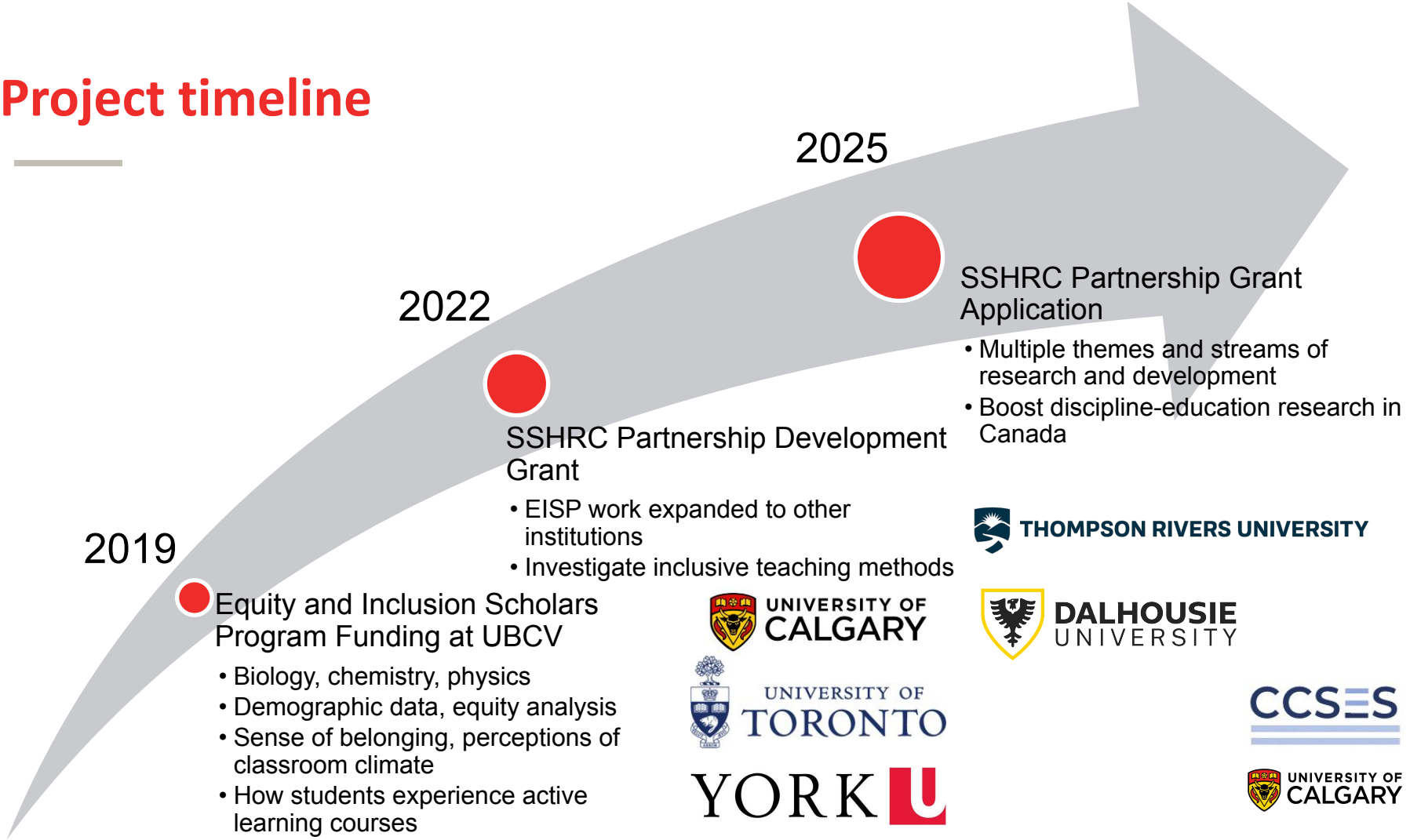
# Canadian Consortium of Science Equity Scholars

---



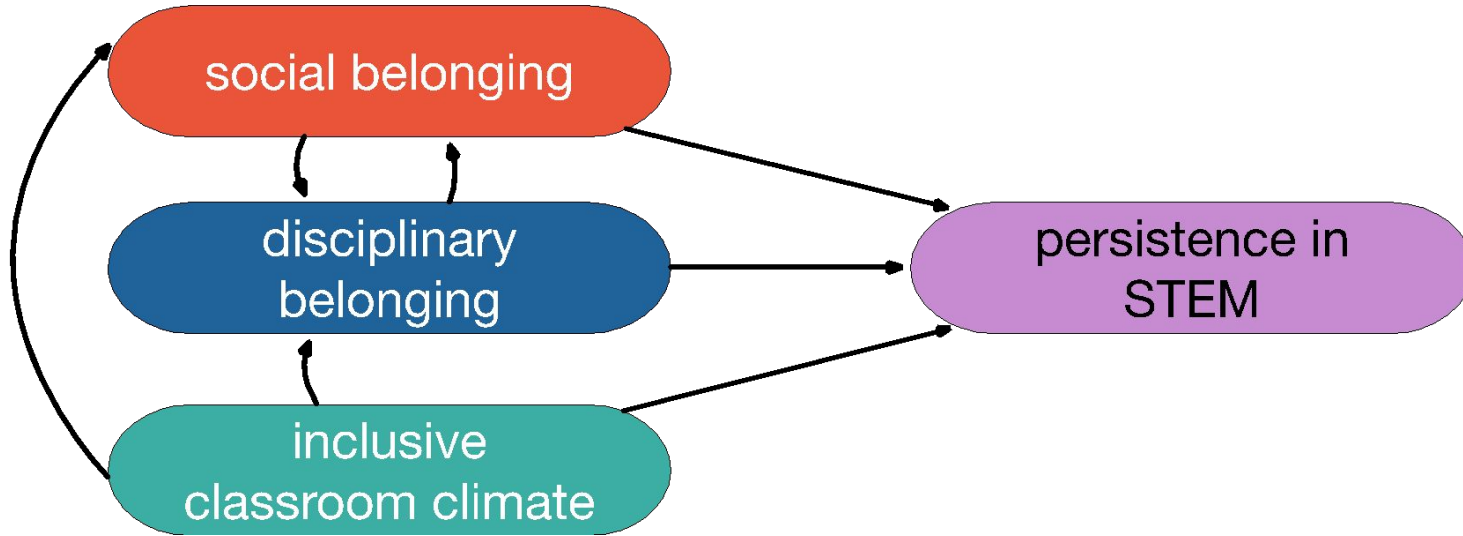
By working together, we can make Canadian STEM education more equitable.

# Project timeline



# Theoretical framework

---



Also collecting: Self-efficacy, course grades, demographic information

# Equity definition

---

“equitable access and opportunity to learn physics, equitable and inclusive learning environment, and equitable outcomes...”

... students from all demographic groups (e.g., regardless of their gender identity or race/ethnicity) who have the pre-requisites to enroll in physics courses have comparable learning outcomes.”



Cwik, S. and Singh, C., “Framework for and review of research on assessing and improving equity and inclusion in undergraduate physics learning environments,” in *The International Handbook of Physics Education*

8

*Research: Special Topics*, edited by M. F. Taşar and P. R. L. Heron (AIP Publishing, Melville, New York, 2023),

pp. 2-1–2-26.

CCSE S



# Equity definition

“equitable access and opportunity to learn physics, equitable and inclusive learning environment, and equitable outcomes...”

... students from all demographic groups (e.g., regardless of their gender identity or race/ethnicity) who have the pre-requisites to enroll in physics courses have comparable learning outcomes.”



Cwik, S. and Singh, C., “Framework for and review of research on assessing and improving equity and inclusion in undergraduate physics learning environments,” in *The International Handbook of Physics Education*

9

*Research: Special Topics*, edited by M. F. Taşar and P. R. L. Heron (AIP Publishing, Melville, New York, 2023),

pp. 2-1–2-26.

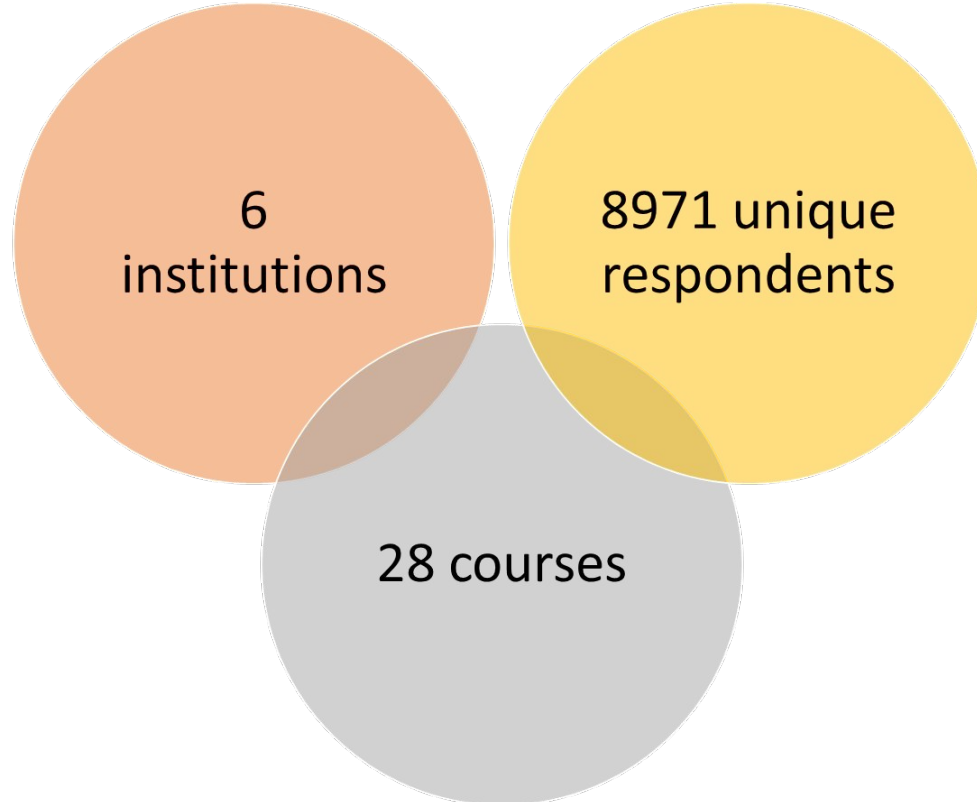
CCSE S

UNIVERSITY OF  
CALGARY



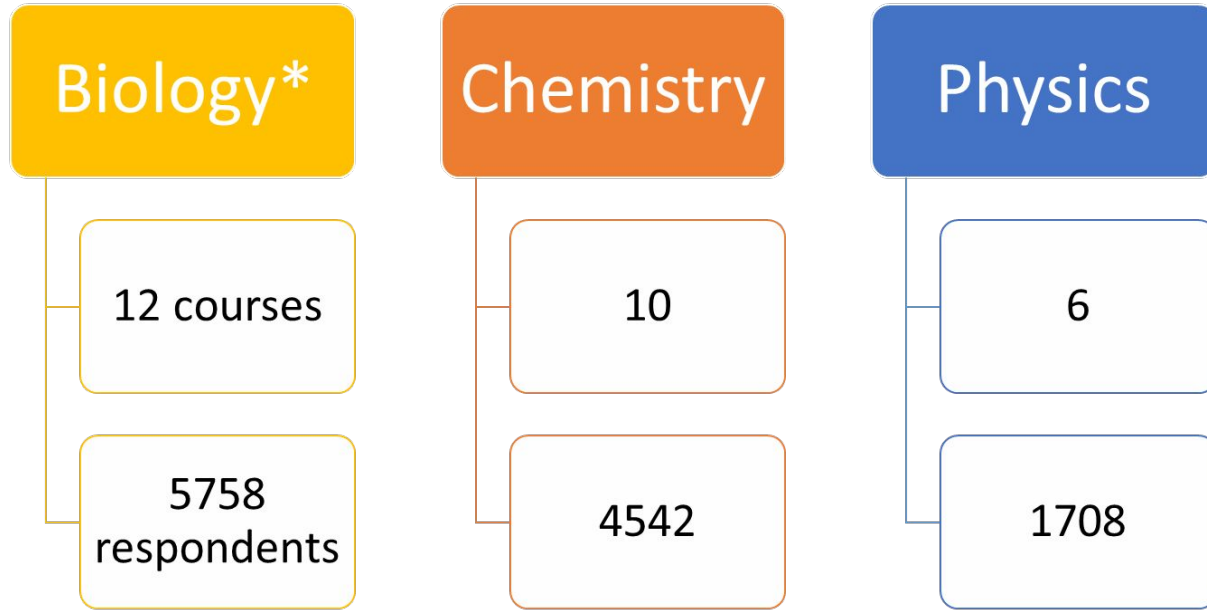
# Year one data collection (2022/2023)

---



# Year one data collection (2022/2023)

---



# Data analysis

---

## Course level

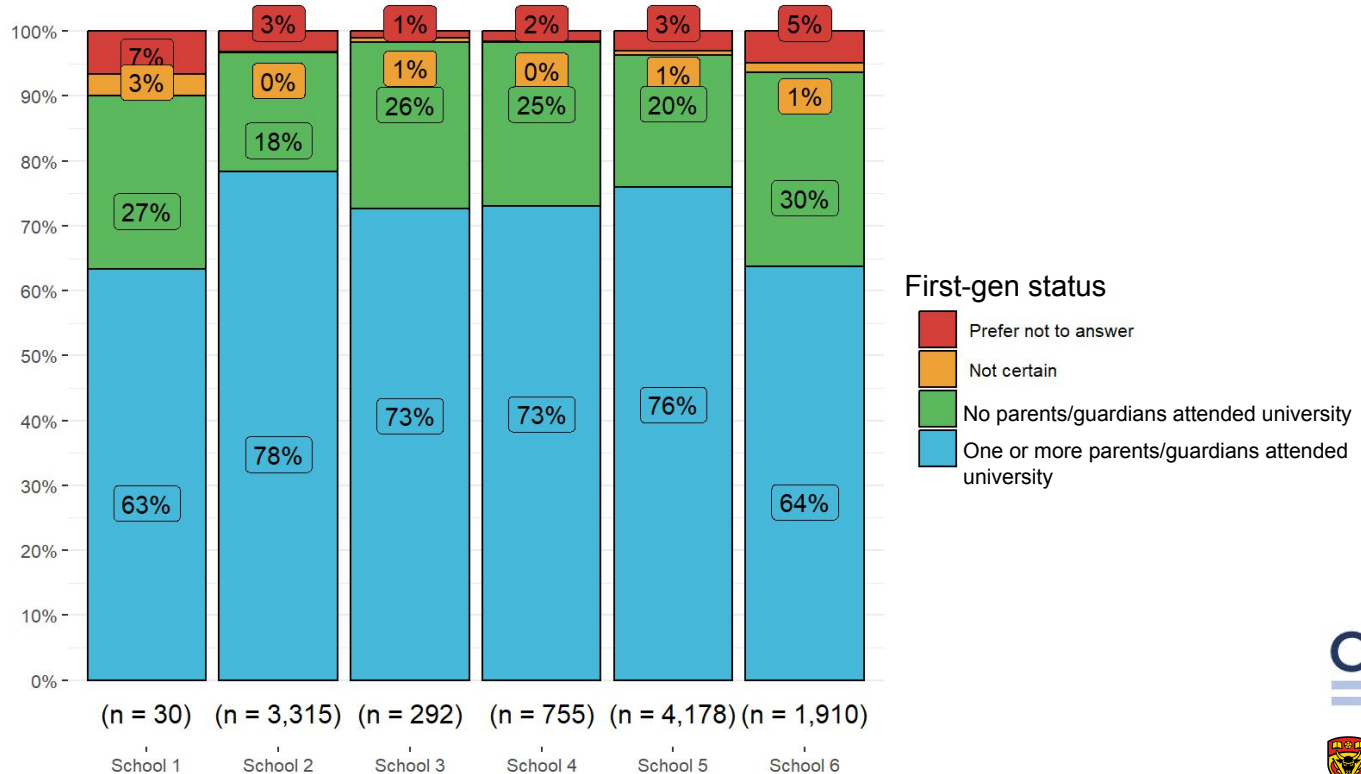
Course report  
shared back to  
instructors

## Project-wide

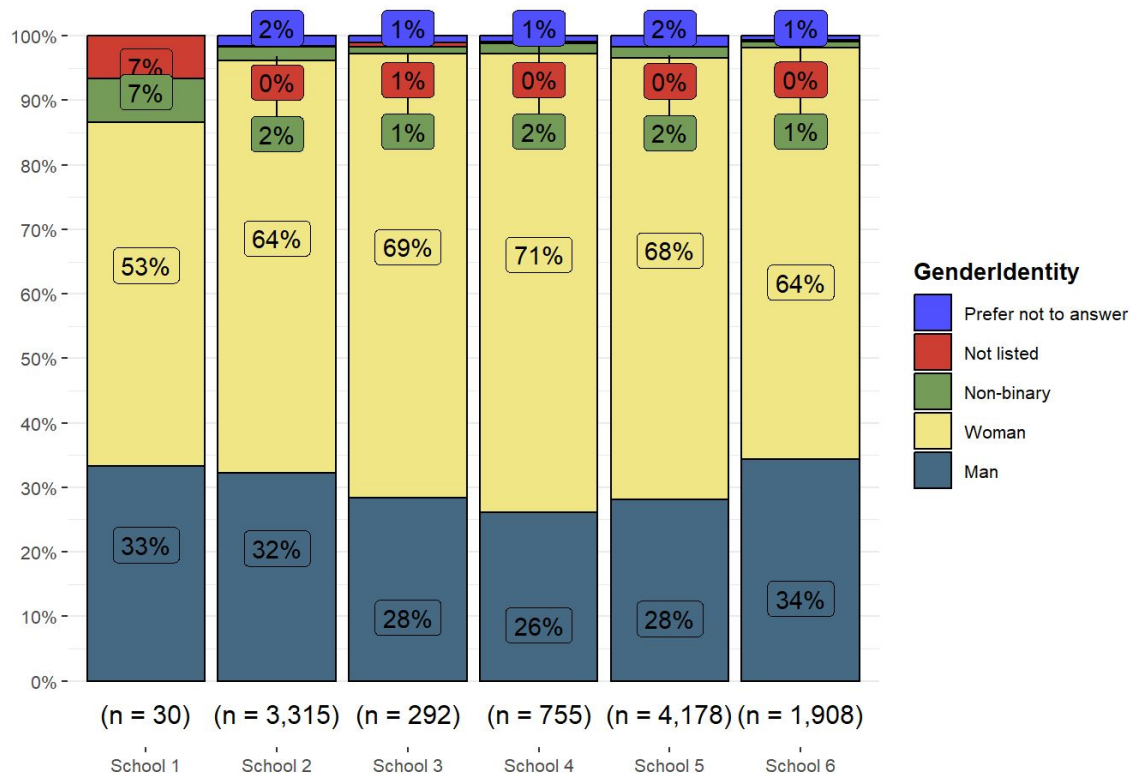
Data collated,  
described

Relationships,  
inequities  
modelled

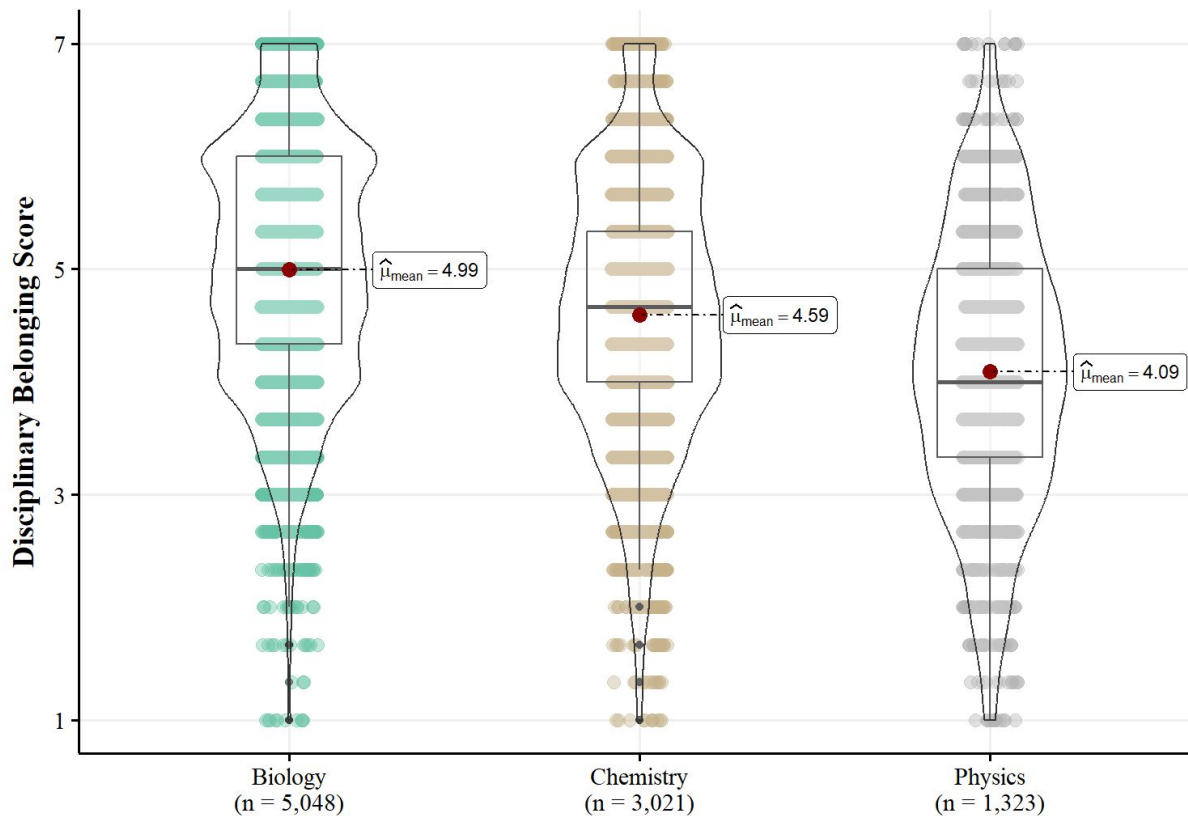
# Project-wide: First-generation status



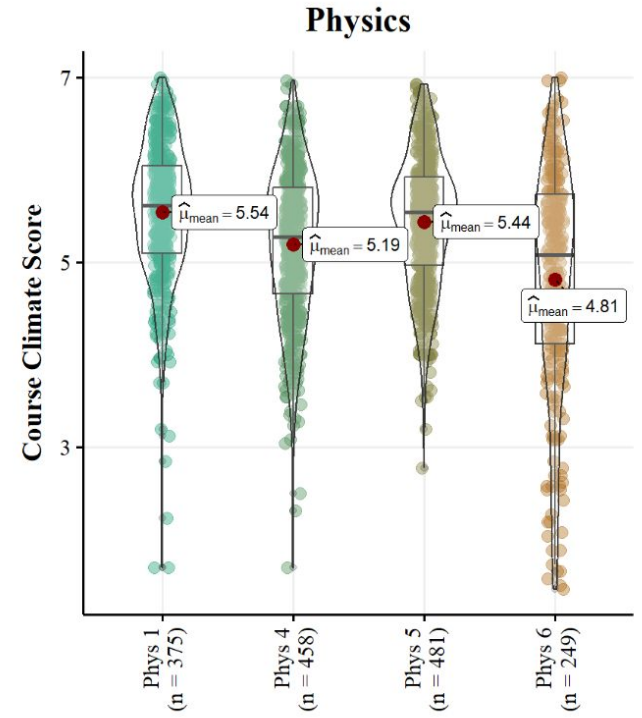
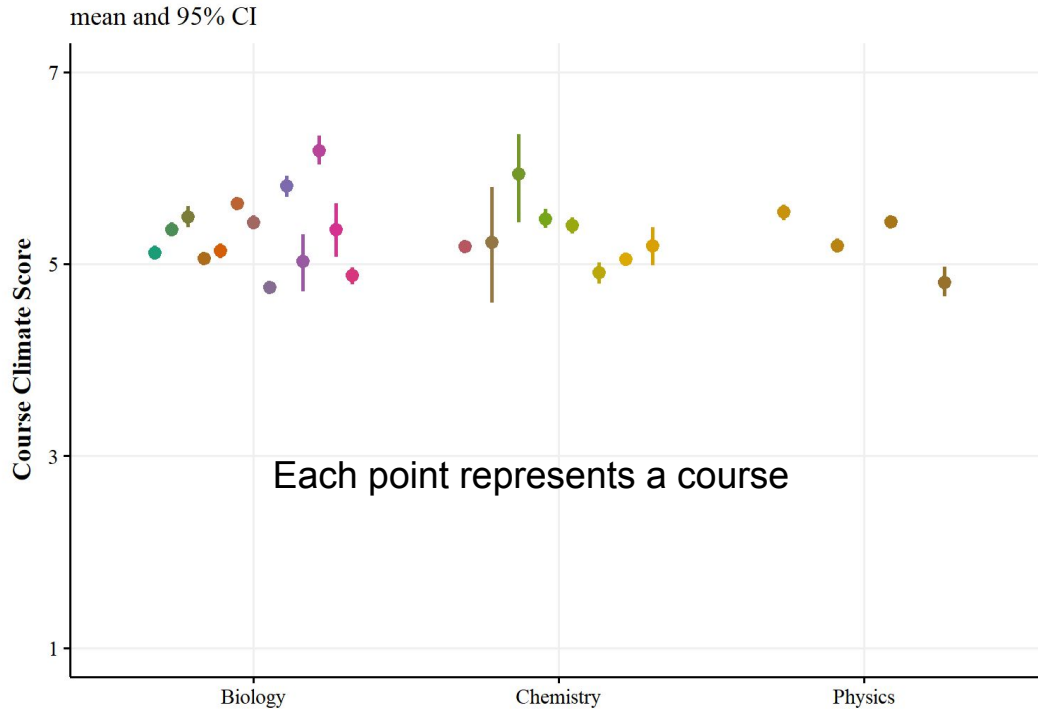
# Project-wide: Gender identity



# Project-wide: Disciplinary belonging (post)

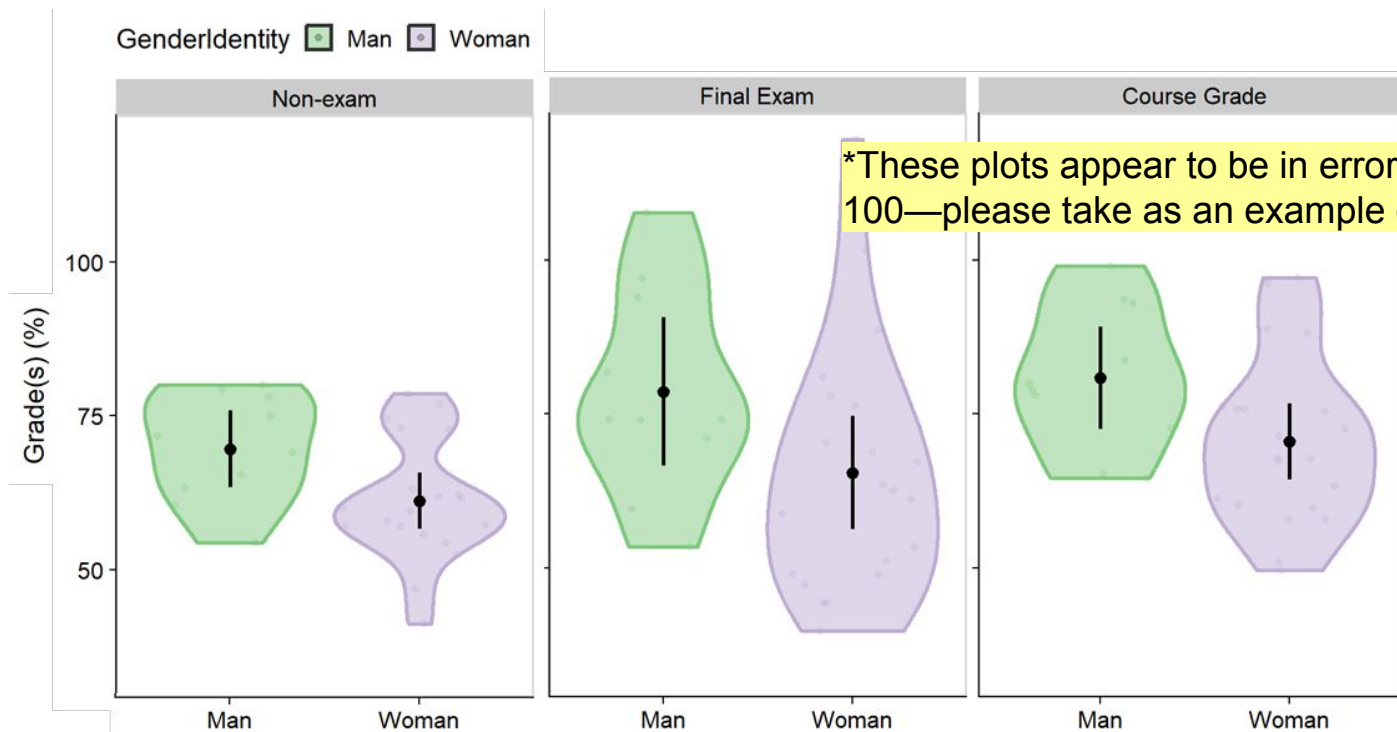


# Project-wide: Classroom climate



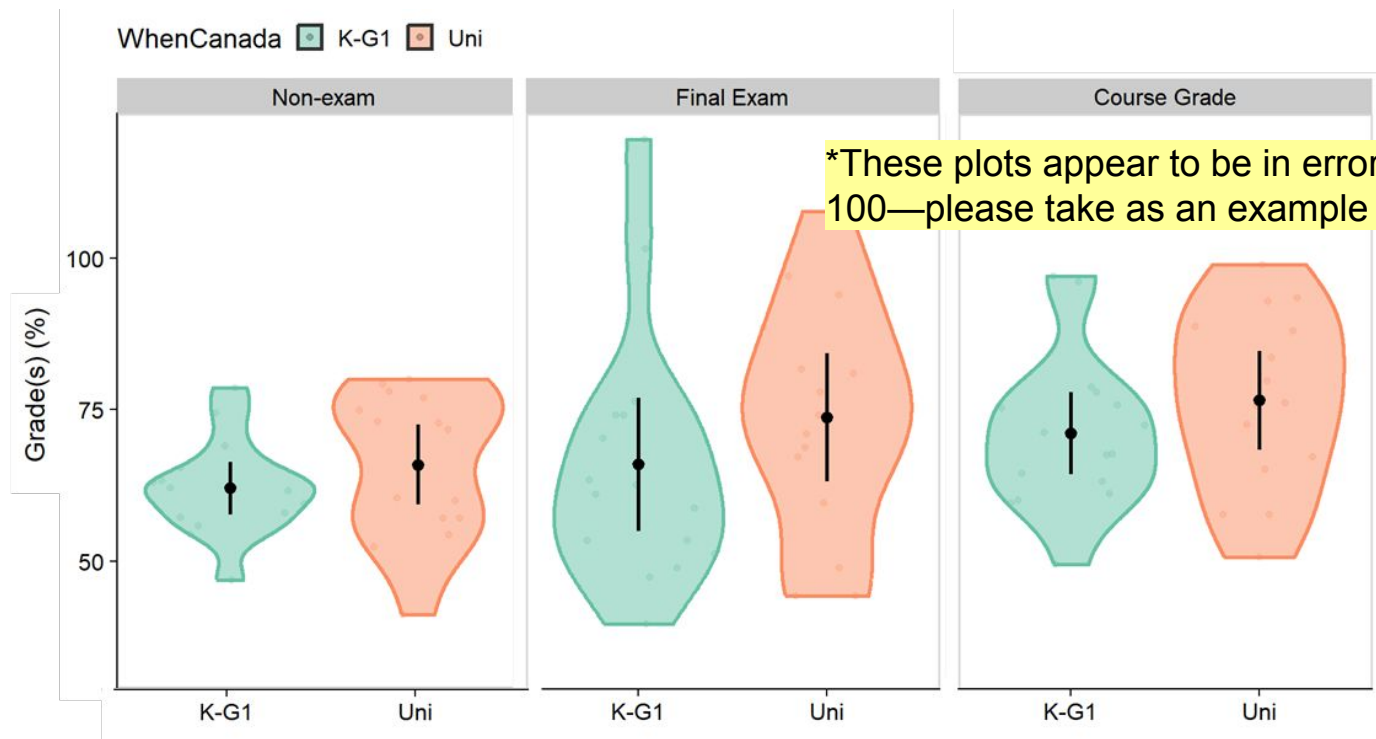
Each point represents a student

# Course-level example\*: Grades disaggregated by gender identity



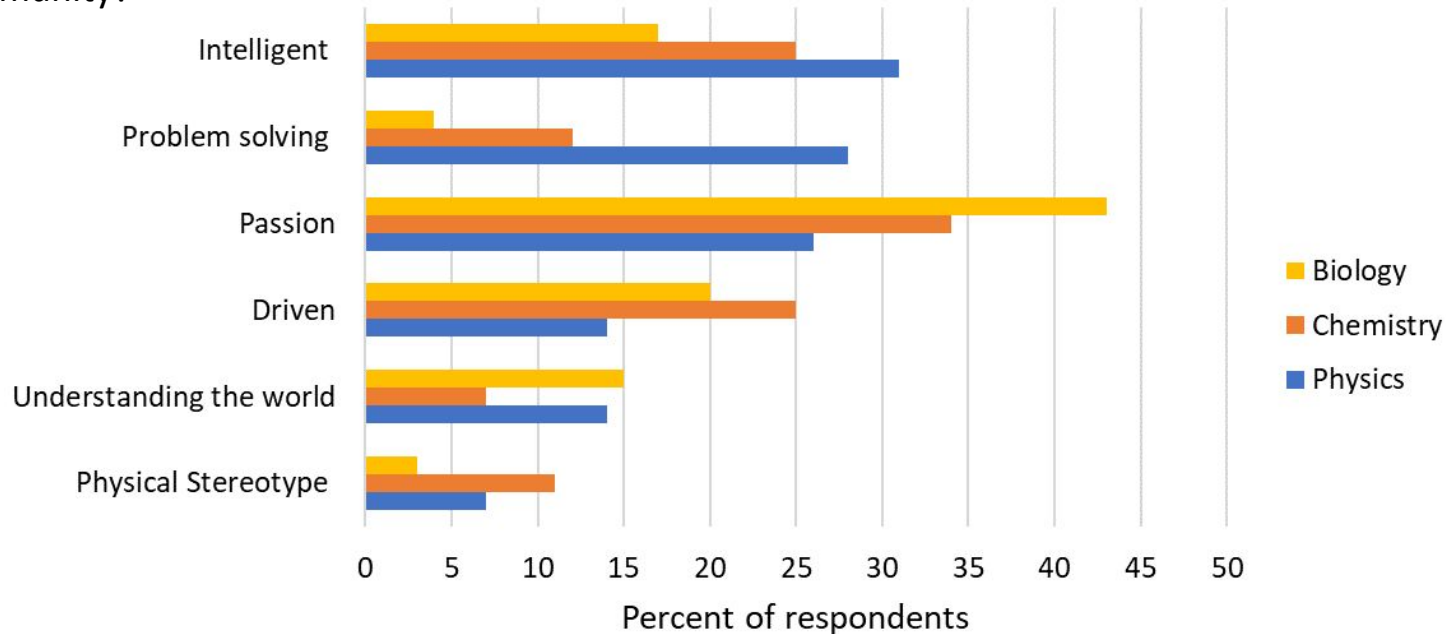


# Course-level example\*: Grades disaggregated by when student started school in Canada



# CCSES sub-project\*: What stereotypes do Canadian students hold?

Thematic coding of: What type of person do you picture when you think of [the biology/chemistry/physics] community?



# Upcoming CCSES research

---

Qualitative, quantitative, mixed-methods research.

Some of our research questions:

- What inequities exist in outcomes in Canadian STEM courses?
- What is the relationship between perception of classroom climate and sense of belonging?
- How do stereotypes impact feelings of belonging in a discipline?
- What structures and aspects of teaching enhance equity?
- What are the limits to course/instructor impact on equity?

# Join!

---

## CCSES community member

Receive info about CCSES community events

**CCSES annual retreat** (online) next week!

## CCSES project collaborator

Ethics review may be needed at your site (we have resources)

Distribute surveys in your class, provide small incentive

Interact via email with the CCSES project team

Liaise with other project collaborators in your institution

Receive **CCSES course report**

**CCSES**



# CCSES annual retreat (June 28/29, online)

June 28  
schedule  
(times in  
Pacific)

DAY 1	SESSION
9:00 - 9:30	Welcome
9:30 - 10:00	Update on CCSES Activities
10:00 - 10:45	Institutional Data Workshop - Inclusive Teaching Theatre
10:45 - 11:00	Break
11:00 - 11:45	Lightning Talks Featuring Student Collaborators
11:45 - 12:45	Invited Speaker: Dr. Cissy Ballen Investigations into Teaching Societally Relevant Biology
12:45 - 1:00	Wrap-up and Overview of Day 2

Welcome for all or for part!

Email [ccses@science.ubc.ca](mailto:ccses@science.ubc.ca) for full schedule and registration link.



# Canadian Consortium of Science Equity Scholars

[ccses@science.ubc.ca](mailto:ccses@science.ubc.ca)

Thompson Rivers University  
University of British Columbia  
University of Calgary  
University of Toronto  
York University

**Seeking M.Sc. student in Physics or  
Transdisciplinary Studies, Fall 2024 start**  
Contact: [jared.stang@ucalgary.ca](mailto:jared.stang@ucalgary.ca)



Social Sciences and Humanities  
Research Council of Canada

Conseil de recherches en  
sciences humaines du Canada

Canada 

CCSES

