

CURE in the time of COVID-19


Student perception and learning in virtual course-based
undergraduate research experiences



Bluenotes **GLOBAL** 2021
VIRTUAL EXPERIENCE

Dr. Sarah Guindre-Parker



 @sci_sgp

 sguindre@kennesaw.edu





Overview



Bookmarks



Course Schedule

- Introduction
- Methods
- Results
- Discussion



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Undergrad
research

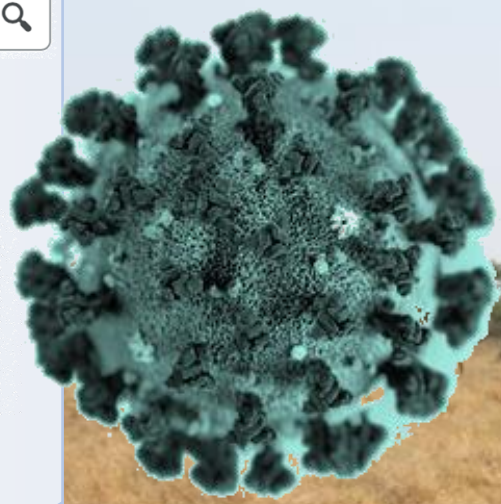
Field
courses



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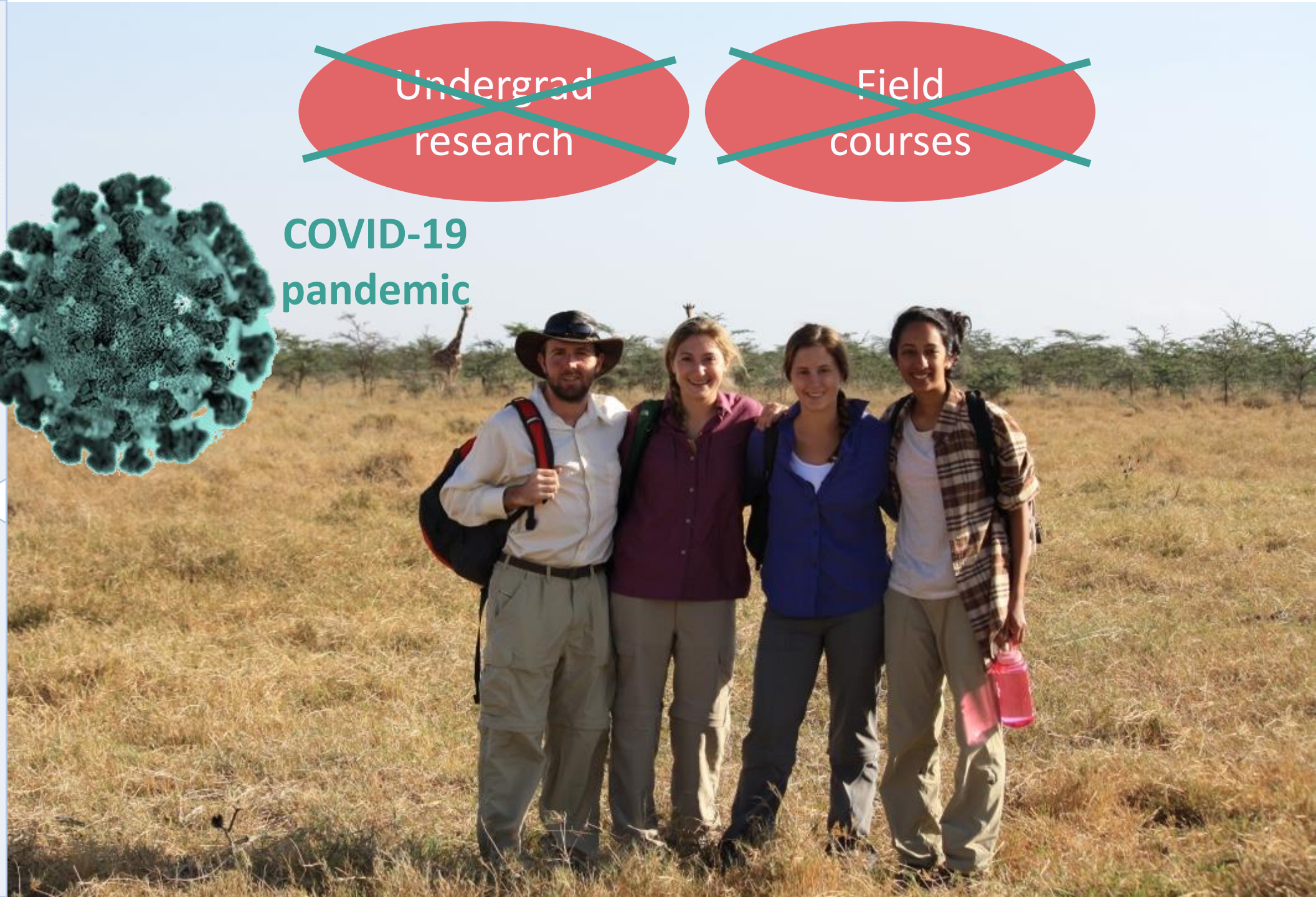
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COVID-19 pandemic

~~Undergrad research~~

~~Field courses~~



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High-impact virtual learning



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High-impact virtual learning

Course-based undergraduate research experience (CURE)



- Students generate new scientific knowledge
- Student-directed research questions
- Follow the scientific methods from beginning to end

High-impact virtual learning

Course-based undergraduate research experience (CURE)



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1. Video data collection



Ecology Lab Research videos
76 videos

- FS5_8Apr20_1007_PR... 25:43
- FS11_3Apr20_958_PR... 25:43
- CF45_15MAY2020_104... 25:43
- CF1_8JUN20_1004_P... 25:43
- CF42_10Apr20_1025_... 25:43
- CF1_1JUN2020_1017_... 27:17

High-impact virtual learning

Course-based undergraduate research experience (CURE)

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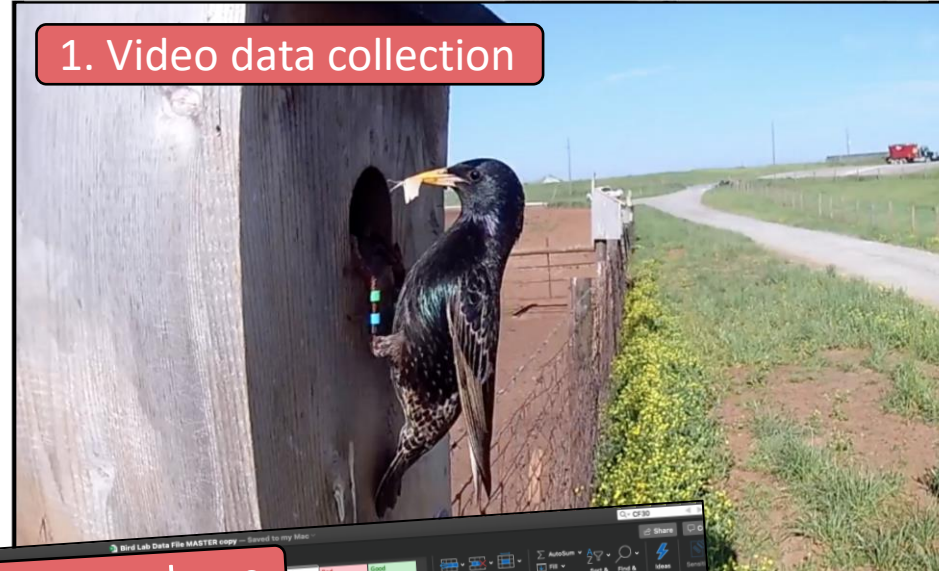
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1. Video data collection



2. Weather data & analyses

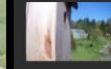
2. Weather data & analyses

Ecology Lab Research videos

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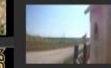
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High-impact virtual learning

Course-based undergraduate research experience (CURE)

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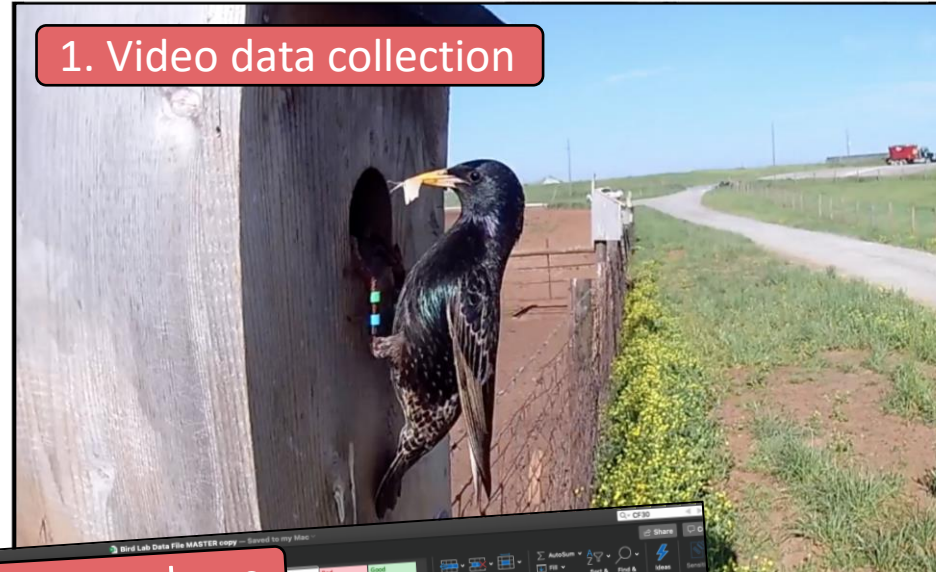
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1. Video data collection



2. Weather data & analyses

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Ecology_Lab_Research_videos

76 videos



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FS11_3Apr20_958_PR... 25:43

3. Report & outreach

Birds play a vital role in our ecosystem. In fact, many birds are important in pest control and pollination, so without them, many ecosystems would fail. Understanding what causes changes in bird behaviors are necessary to preserve bird populations.



European Starlings can detect when a storm is coming by using a special organ in their ear. In turn, the parent Starlings can prepare for potential guarding or feeding problems.



Strong winds do not affect the amount of time a parent Starling spends at their nest. Actually, European Starlings perch or scavenge on the ground in case of high wind speeds.

In the case of extreme conditions, the Starling may change its normal routine to ensure the healthy and safety of their offspring.

But, human developments may alter the habitat that many birds rely on.

Conservation of bird habitats is necessary to protect the bird population, and to maintain a balanced ecosystem.



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High-impact virtual learning

Synchronous

Asynchronous



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High-impact virtual learning

Synchronous

- Similar to traditional lecture format
- Address questions in real-time
- Students can learn from one another
- Facilitates group work or collaboration
- May be more engaging?

Asynchronous



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High-impact virtual learning

Synchronous

- Similar to traditional lecture format
- Address questions in real-time
- Students can learn from one another
- Facilitates group work or collaboration
- May be more engaging?

Asynchronous

- May be an unfamiliar format for many learners
- Flexibility in scheduling
- Self-paced
- May require more organization upfront but less time to implement



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Research Questions

Do student perceptions or learning differ in virtual courses taught synchronously versus asynchronously?



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Research Questions

Do student perceptions or learning differ in virtual courses taught synchronously versus asynchronously?

Do perceptions or learning differ for students who did not have prior research experiences compared to ones that did in virtual courses?



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Research Questions

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Is one course modality better than the other for students new to research?



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Research Questions

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Online CURE



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- All students received identical lectures & materials
- **Synchronous section:** encouraged to attend synchronous lectures online
- **Asynchronous section:** provided with identical lecture to watch independently



Online CURE

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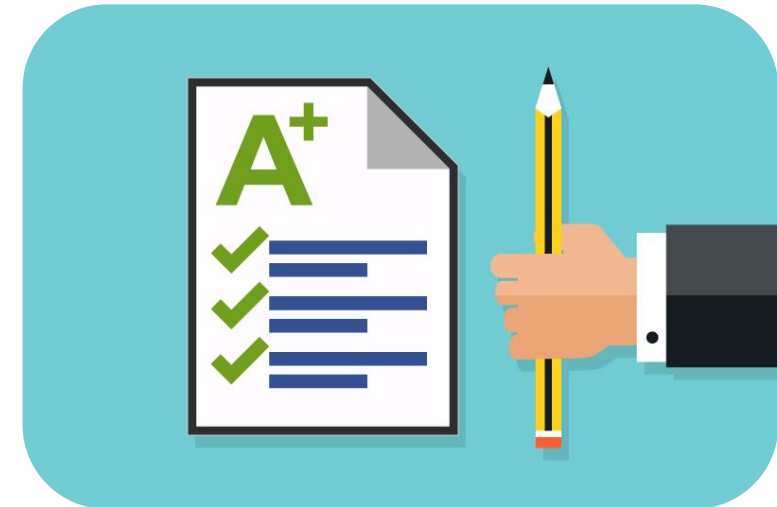
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Student Perception Data




Student Learning Data

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Student Perception Data

| | |
|--------------------------|-----------------------------|
| <input type="checkbox"/> | Current Surveys |
| <input type="checkbox"/> | Survey 1: Background ▼ |
| <input type="checkbox"/> | Survey 2: Literature ▼ |
| <input type="checkbox"/> | Survey 3: Hypotheses ▼ |
| <input type="checkbox"/> | Survey 4: Data collection ▼ |
| <input type="checkbox"/> | Survey 5: Analyses ▼ |
| <input type="checkbox"/> | Survey 6: Peer review ▼ |
| <input type="checkbox"/> | Survey 7: SciComm ▼ |

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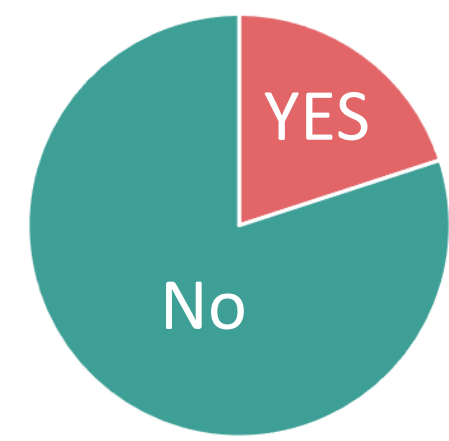
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Student Perception Data


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| <input type="checkbox"/> | Survey 6: Peer review |
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Background information was requested:


- Major (*Biology or Environmental Science*)
- Year of Study (*Sophomores to Seniors*)
- Prior Research Experience?



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Methods

Results

Discussion

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| <input type="checkbox"/> | Survey 5: Analyses | ▼ |
| <input type="checkbox"/> | Survey 6: Peer review | ▼ |
| <input type="checkbox"/> | Survey 7: SciComm | ▼ |

Students rated five things about each module:

- Excitement towards module
- Perceived learning
- Quality of instruction
- Ability to seek help
- Usefulness for future careers



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| <input type="checkbox"/> | Survey 5: Analyses | ▼ |
| <input type="checkbox"/> | Survey 6: Peer review | ▼ |
| <input type="checkbox"/> | Survey 7: SciComm | ▼ |

I averaged an individual's scores for all modules

- Excitement towards module
- Perceived learning
- Quality of instruction
- Ability to seek help
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Student Perception Results



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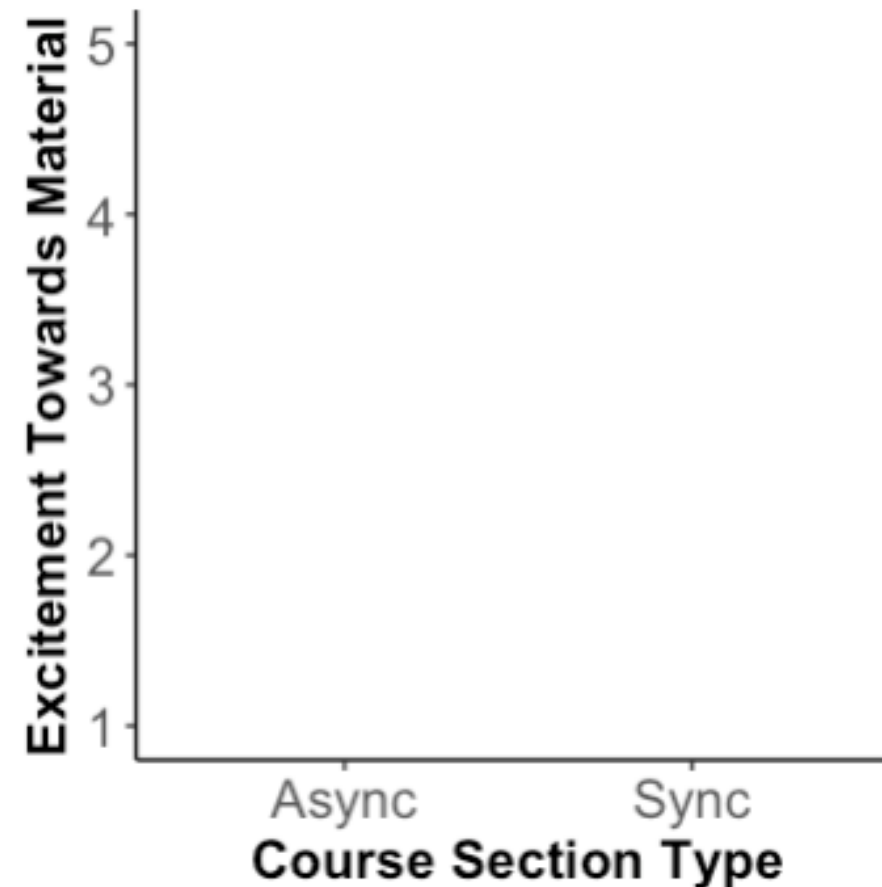
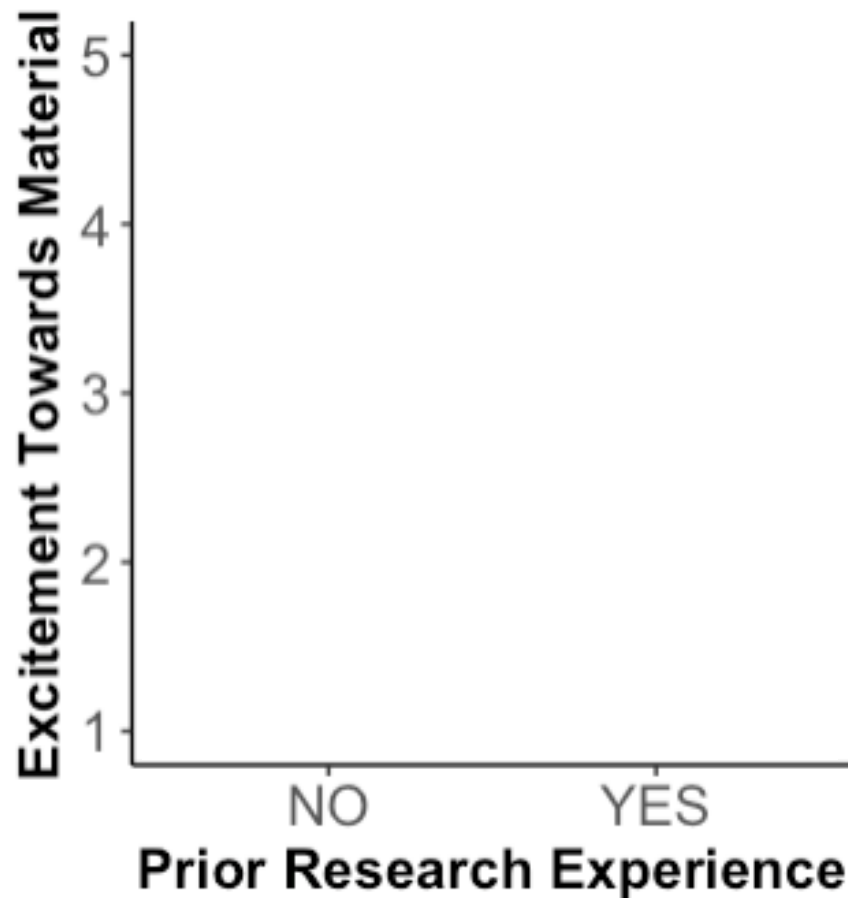


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Student Perception Results



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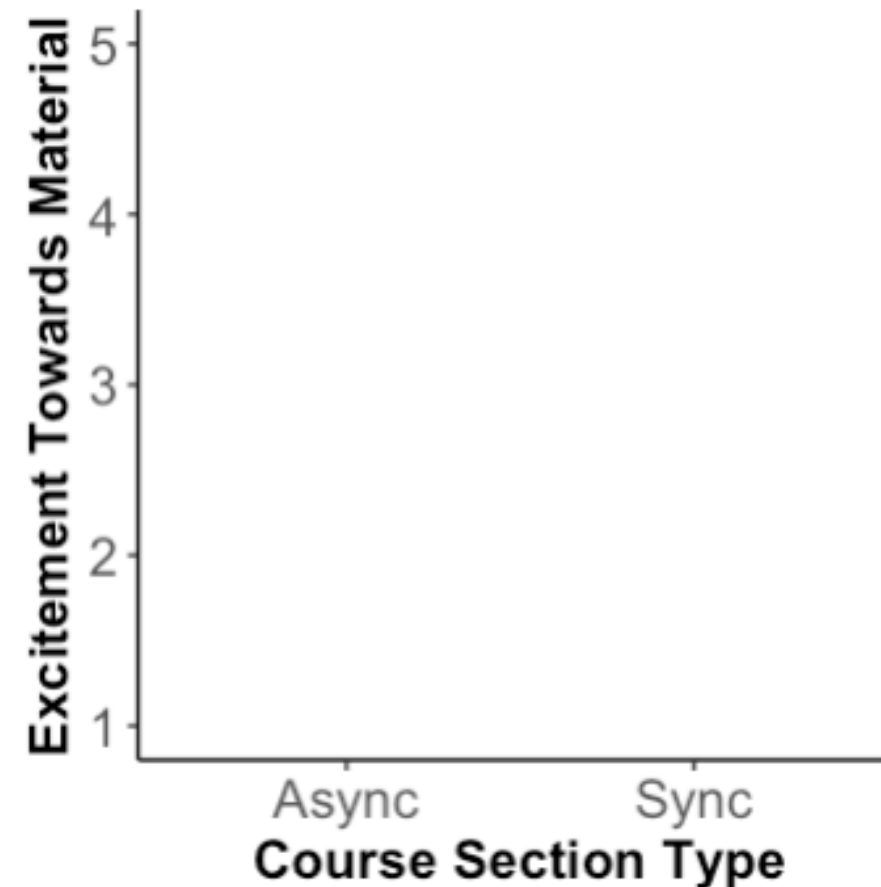
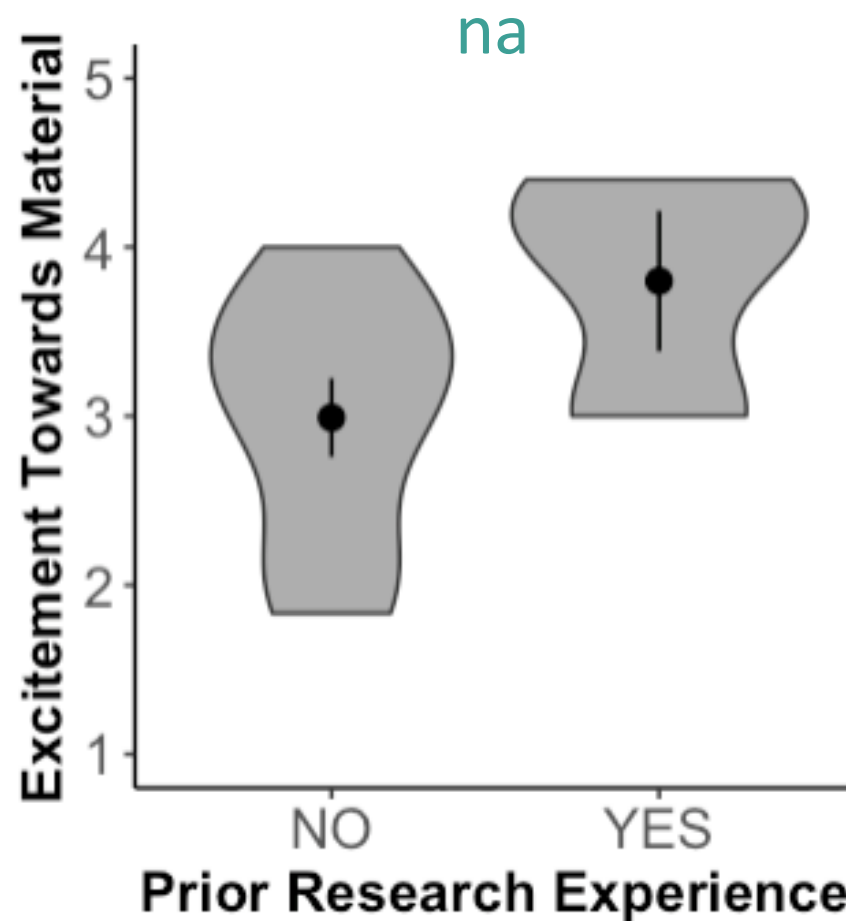


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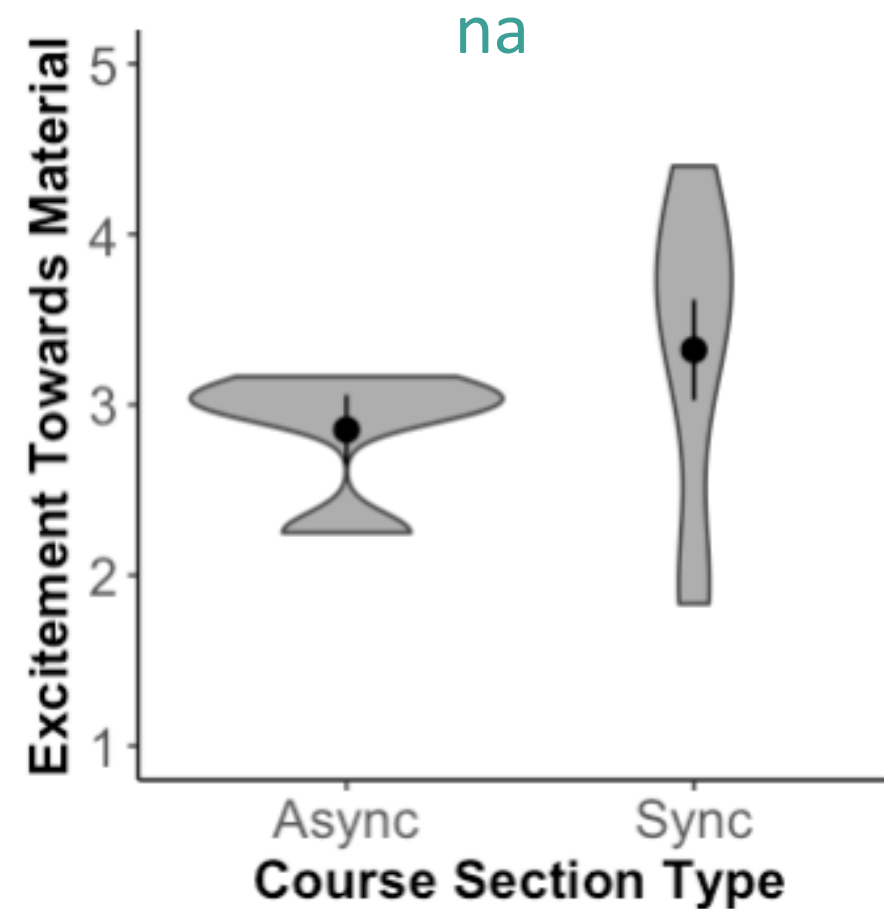
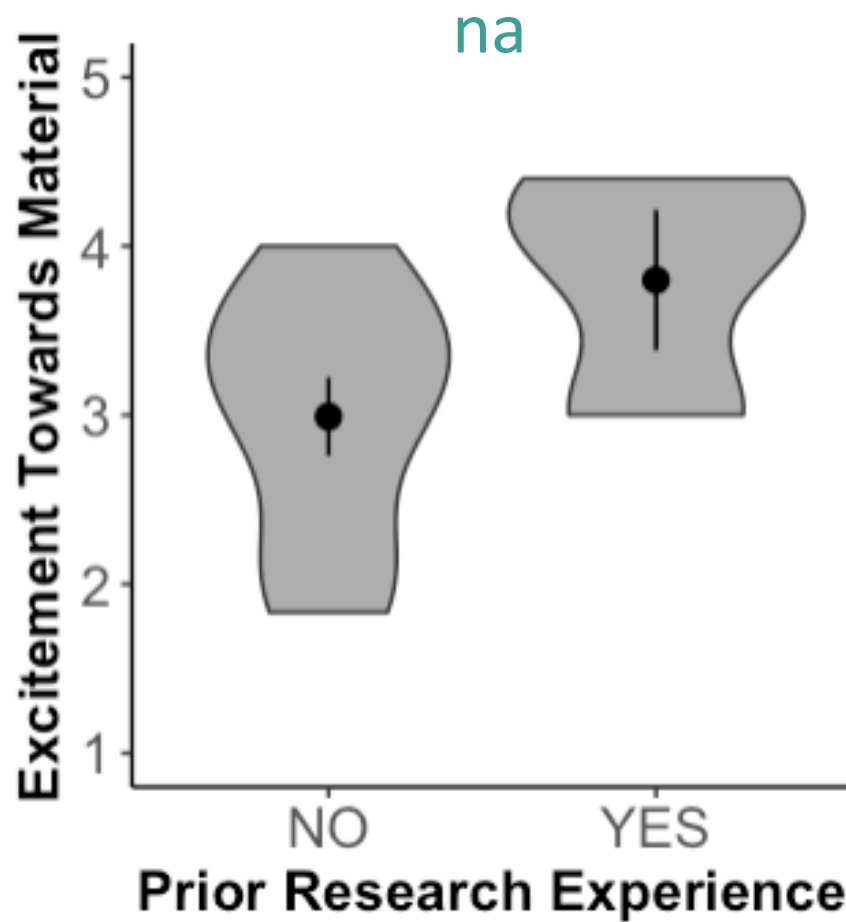
Student Perception Results



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Student Perception Results

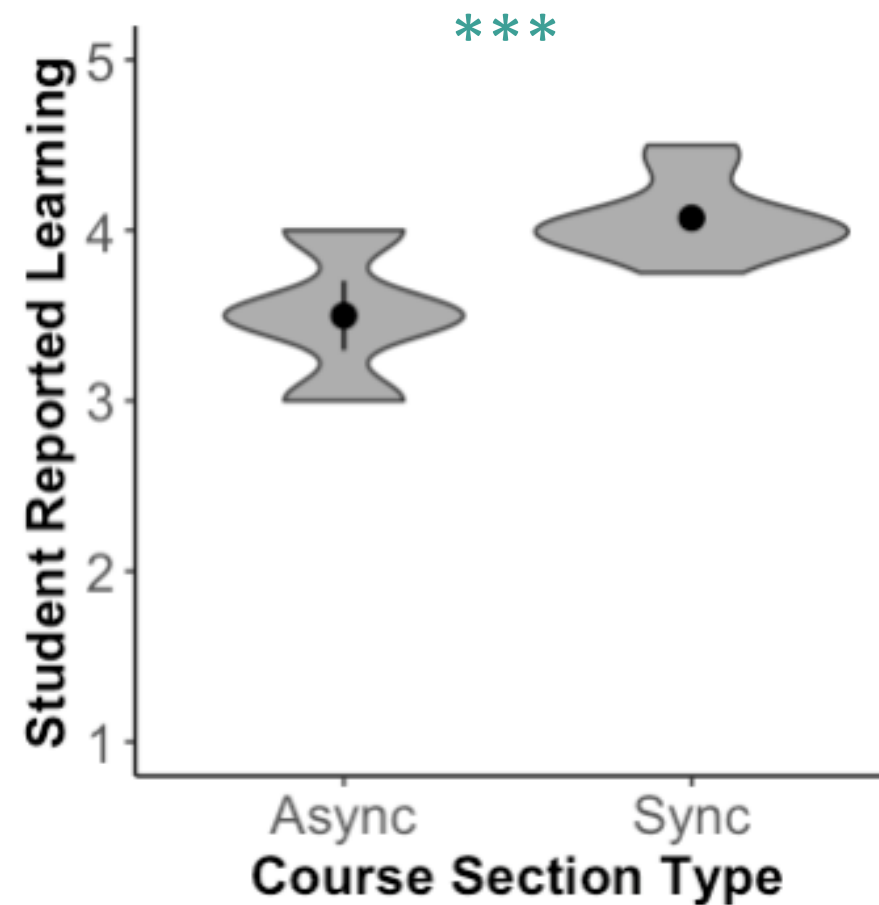
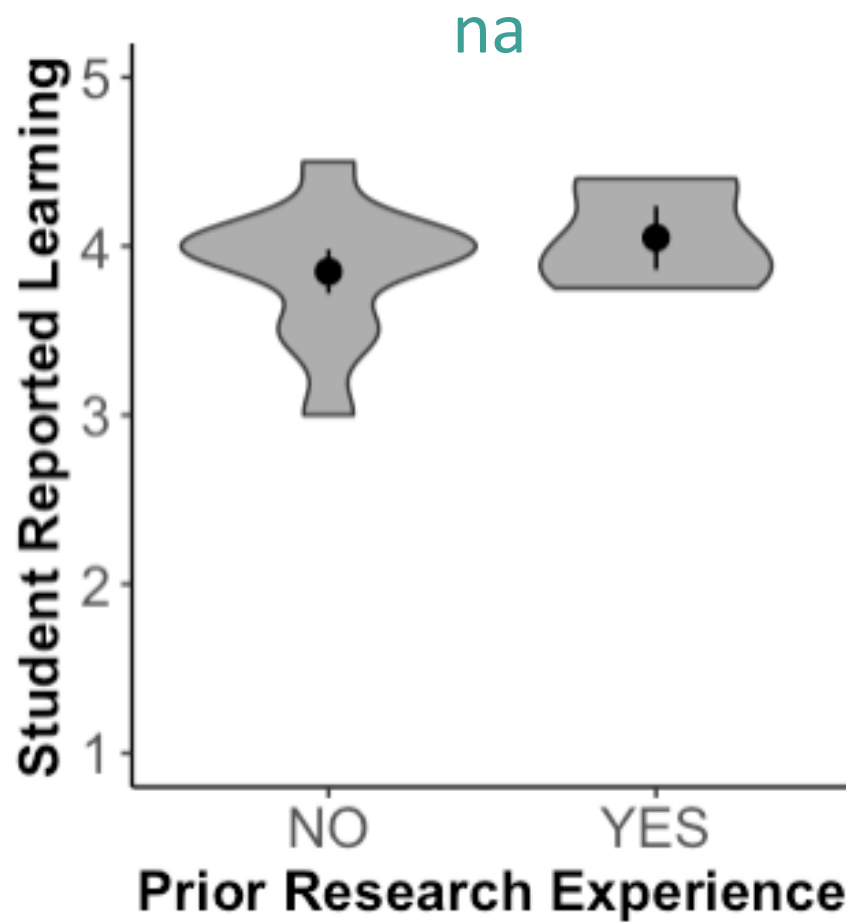


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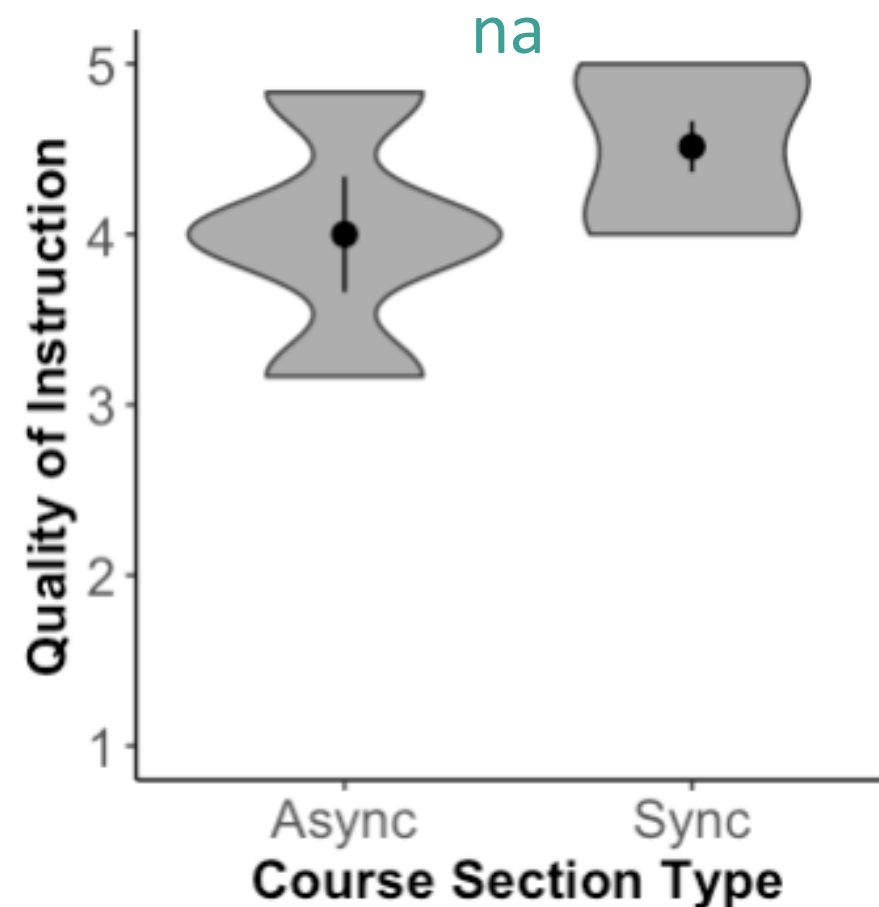
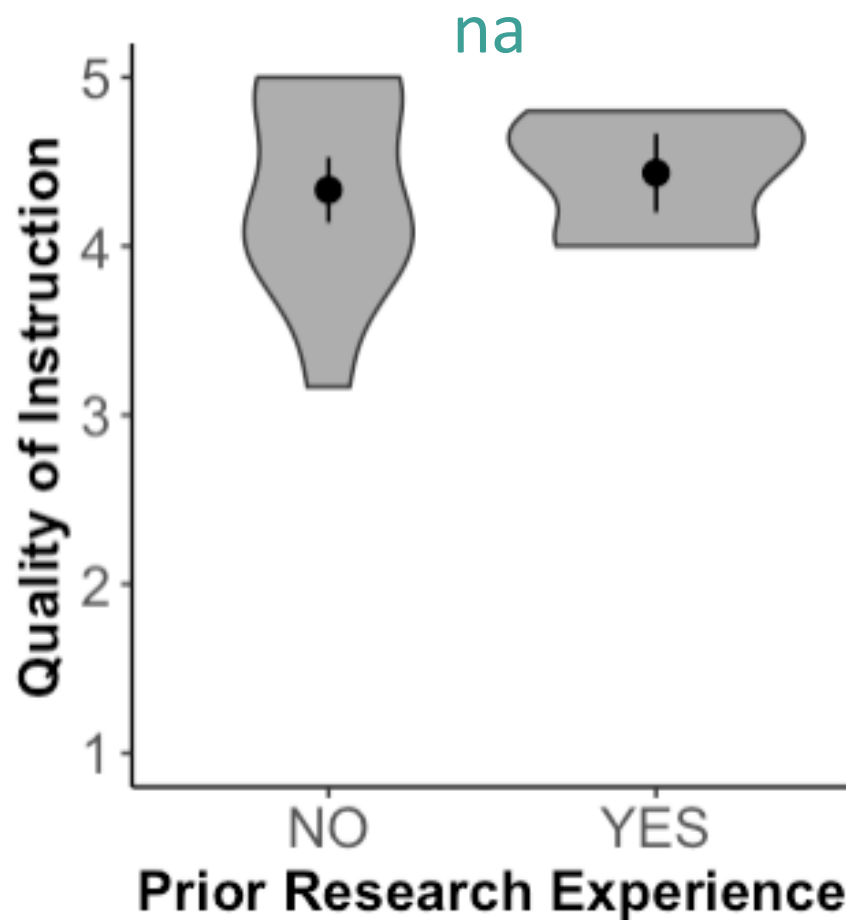


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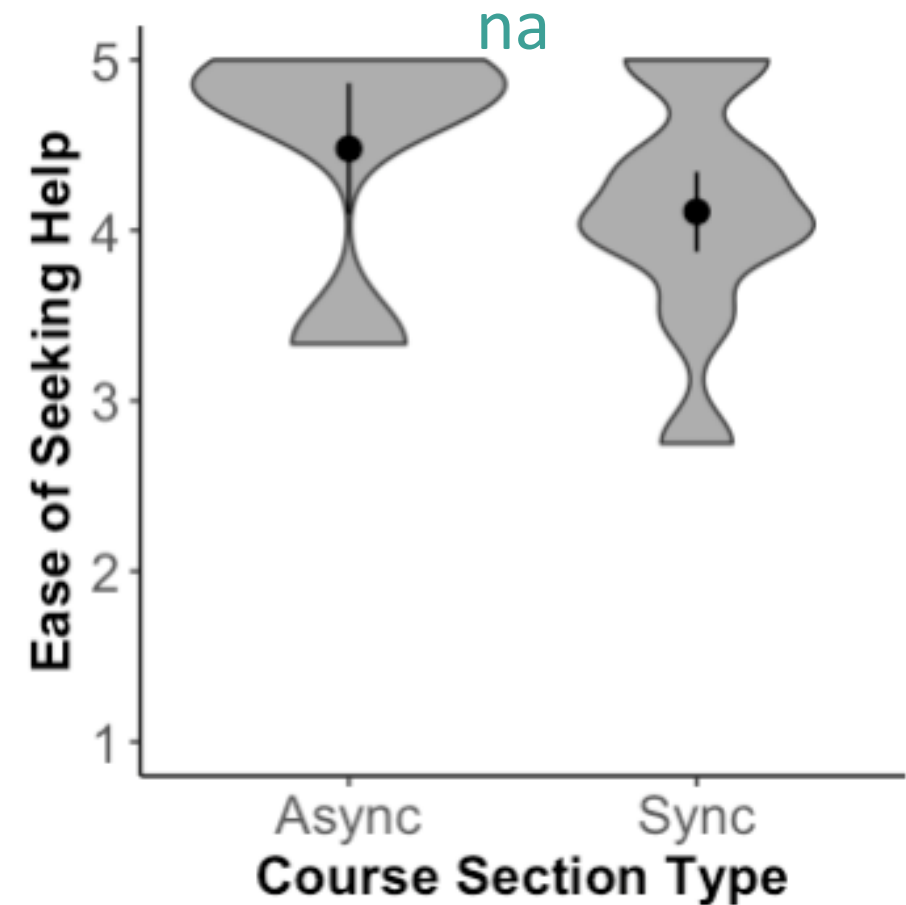
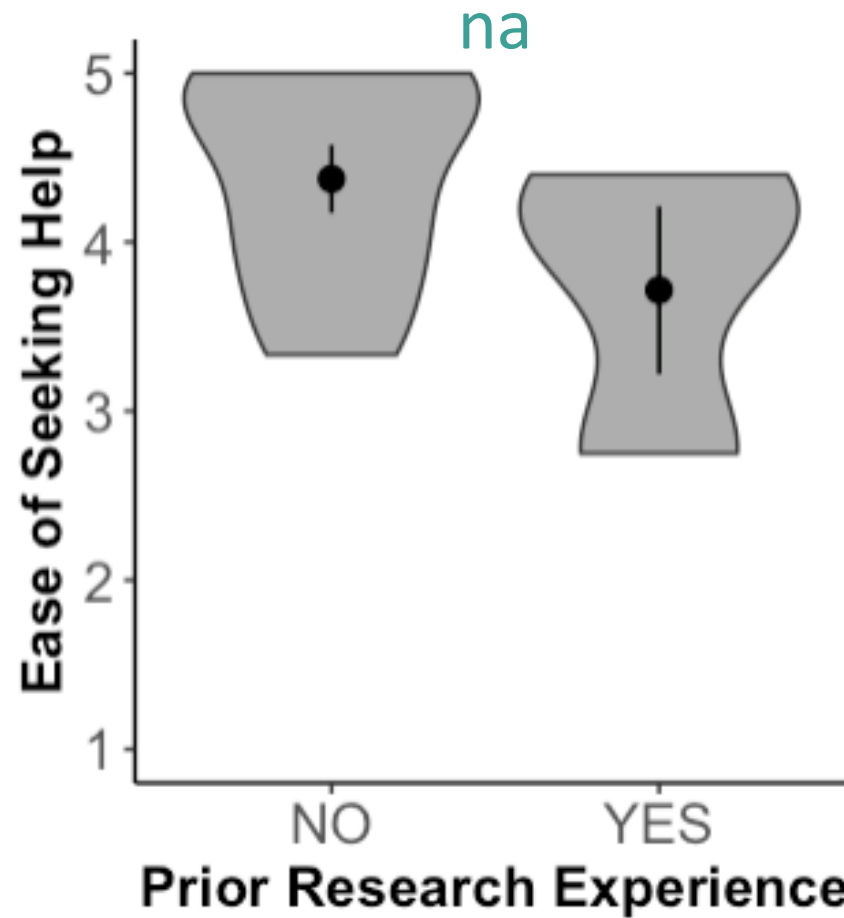


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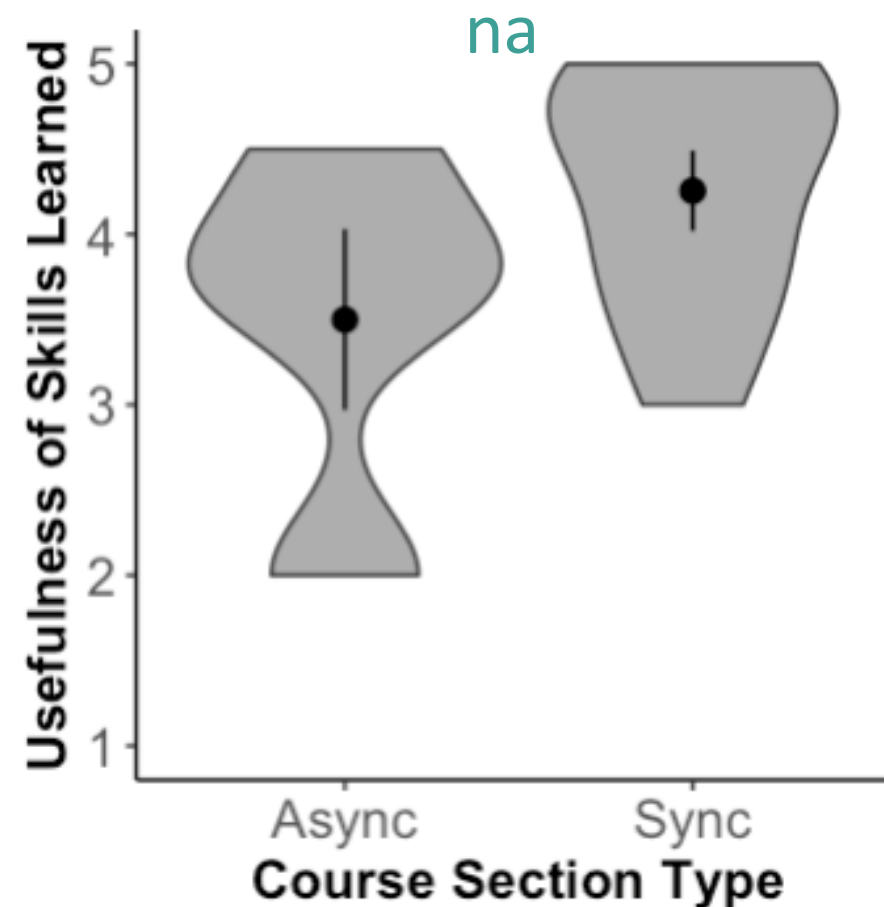
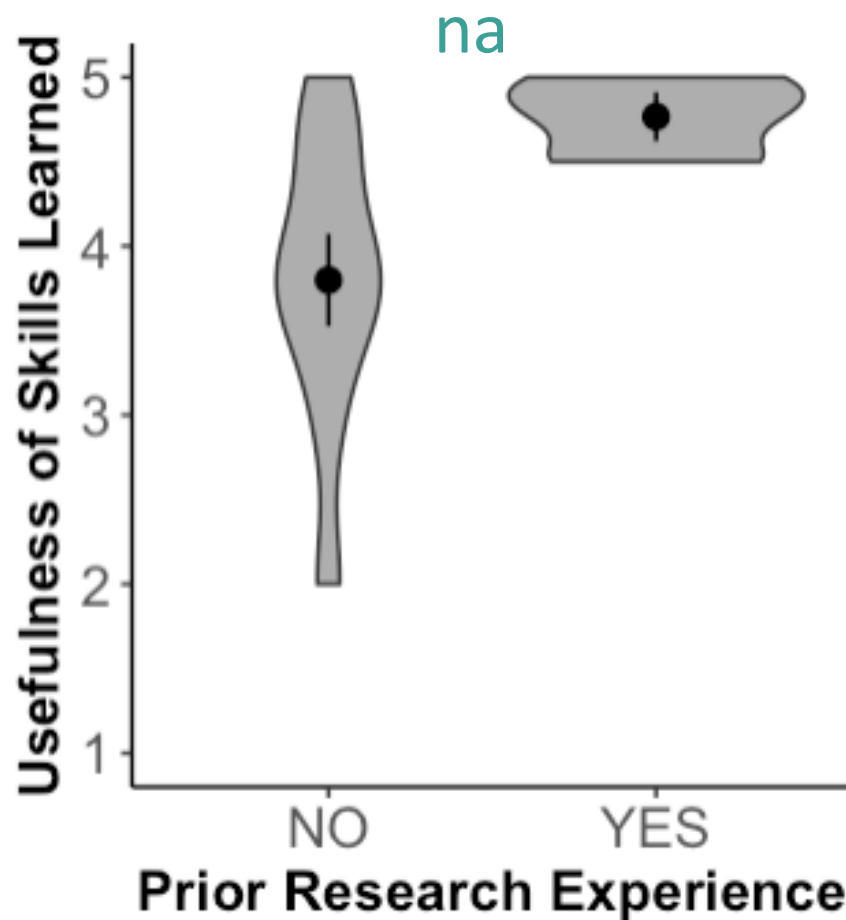
Student Perception Results



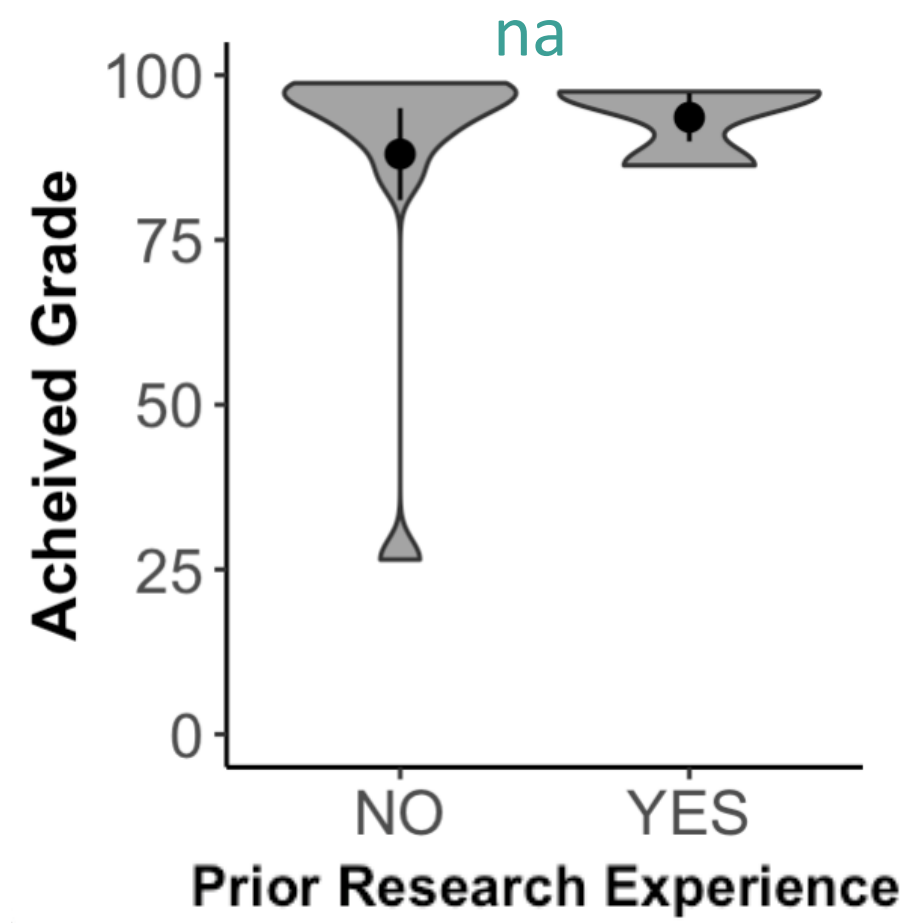
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Student Learning Results

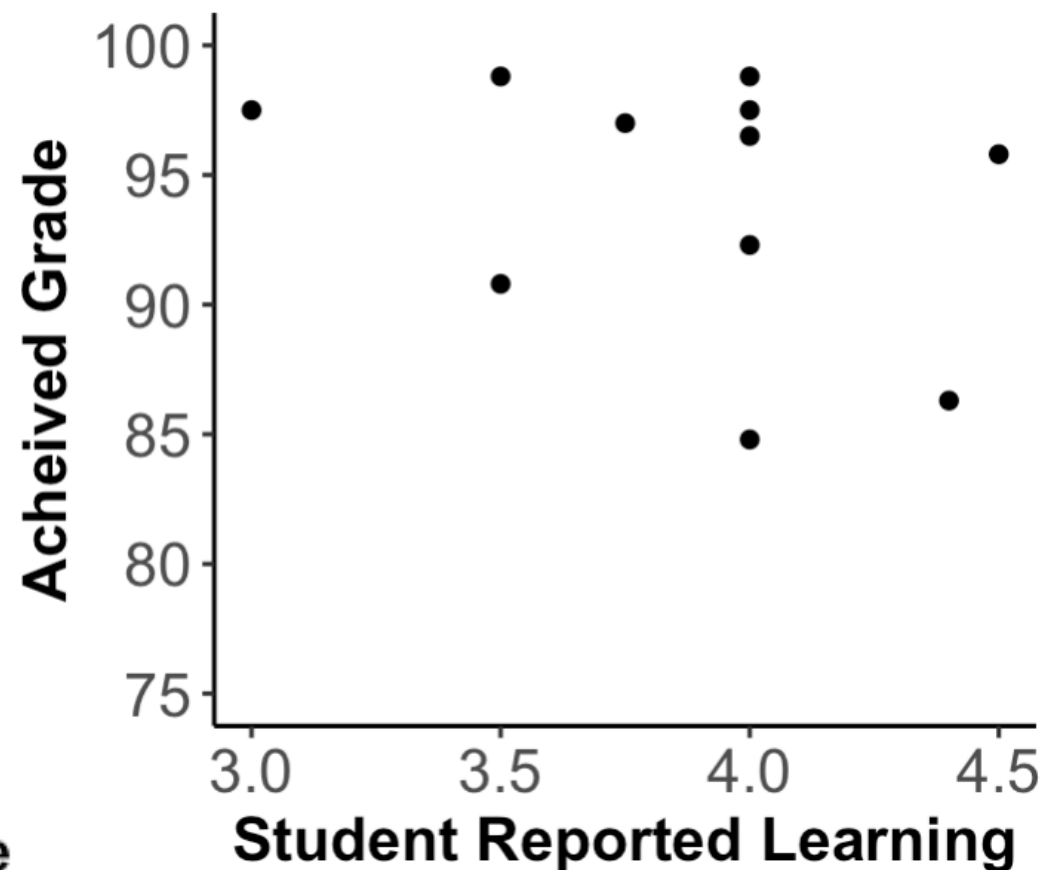
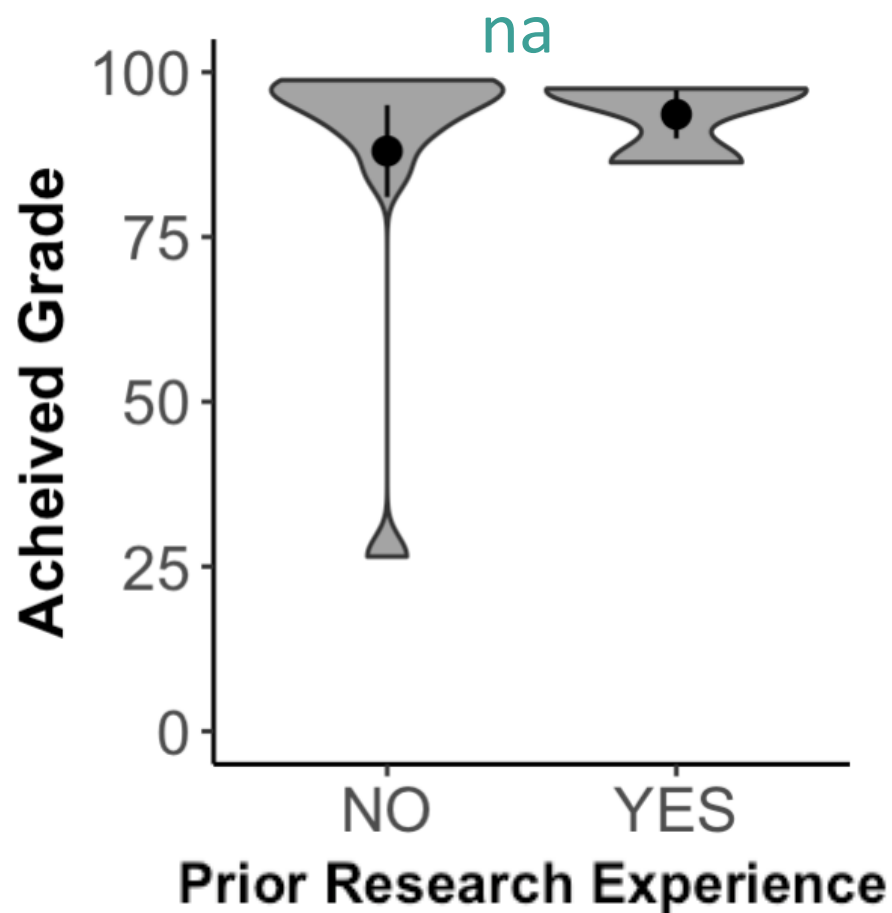


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Student Learning Results





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Student perception and learning do not differ significantly

- For students in a synchronous or asynchronous online course
- For students with or without prior research experience



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Student perception and learning do not differ significantly

- For students in a synchronous or asynchronous online course
- For students with or without prior research experience

Interacting with the instructor in real-time:

- May simply be more familiar to students, so they perceived learning more this way
- May help foster a growth mindset



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Future Directions

- Explore whether each course module was equally effective in both synchronous or asynchronous course modalities
 - Do perceptions or learning differ?
- Use these results to generate recommendations for implementing future virtual CURE
 - Increases accessibility of traditional “field” research to broader groups of learners

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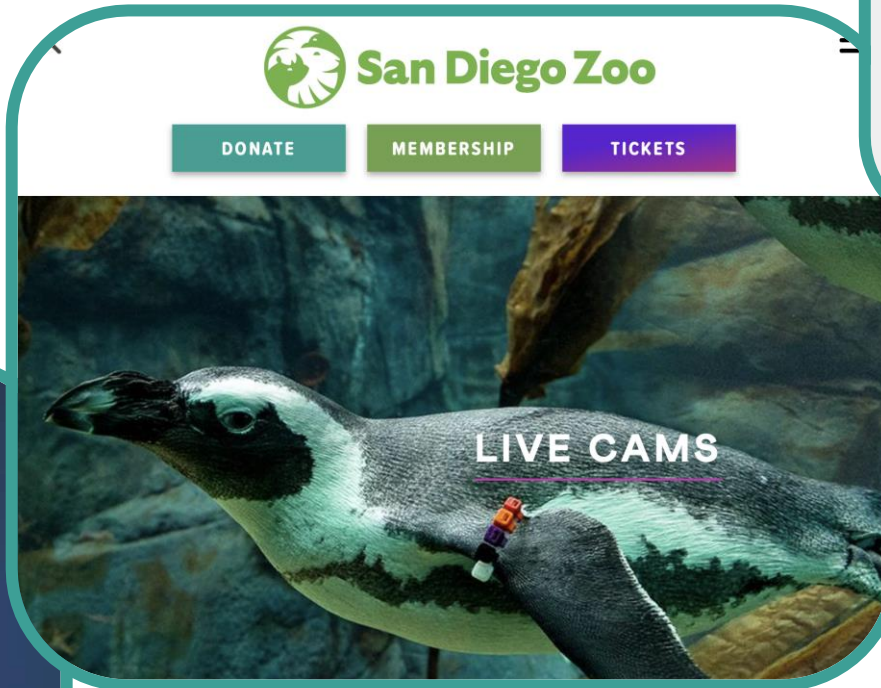
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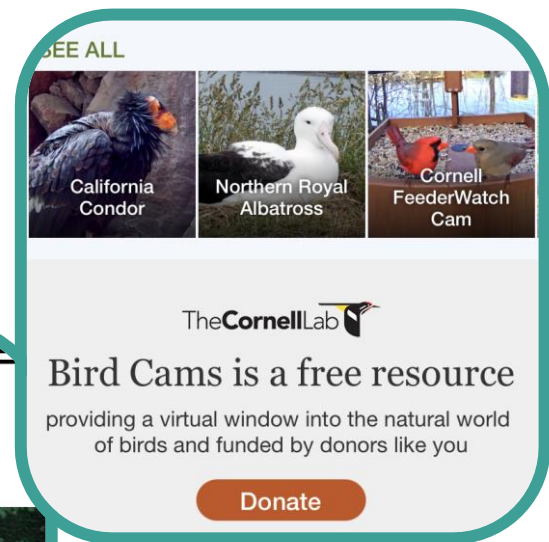
Future Directions



<https://www.squirrel-net.org>



<https://zoo.sandiegozoo.org/live-cams>



<http://cams.allaboutbirds.org>

Thank you!



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group



Dr. Sarah Guindre-Parker

 @sci_sgp

 sguindre@kennesaw.edu