

# Scientific Practices in Introductory Physics Labs

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Departments of Physics and Chemistry

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# Outline

- 1 Introduction to X-Labs
- 2 Progress in Physics
- 3 Research being presented at this conference



# Cross-disciplinary lab transformation

## Biology

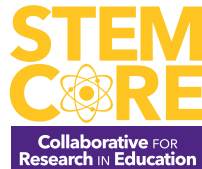
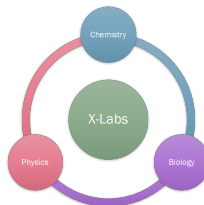
- Co-PI: Heather Vance-Chalcraft
- Co-PI: Kristine Callis-Duehl
- Taria Crenshaw

## Physics

- Co-PI: Steven Wolf
- Mark Sprague
- Robert Seip
- Heather Hundley

## Chemistry

- Project Lead: Joi Walker
- Rosa Bell
- Feng Li
- Annalisa Smith-Joyner
- Kate Hosbein



Award # 1725655

# Cross-disciplinary lab transformation

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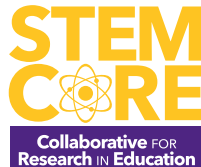
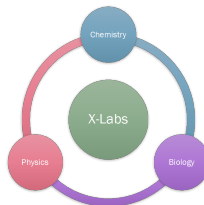
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## Research Question

How do scientific practices transfer between disciplines?



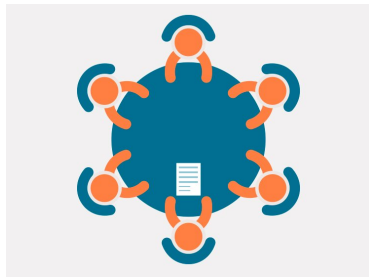
# Steps to transform a lab

- 1 Evaluate/assess what you have (curriculum and resources)



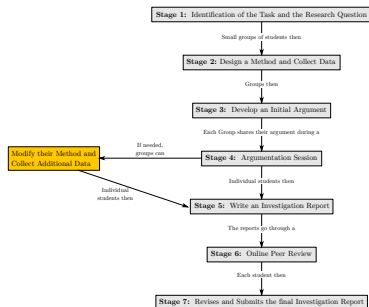
# Steps to transform a lab

- 1 Evaluate/assess what you have (curriculum and resources)
- 2 Determine what the department wants



# Steps to transform a lab

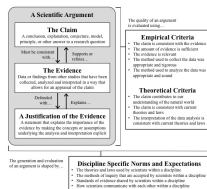
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- 2 Determine what the department wants
- 3 Choose a curricular framework



# Steps to transform a lab

- 1 Evaluate/assess what you have (curriculum and resources)
- 2 Determine what the department wants
- 3 Choose a curricular framework
- 4 Write the curriculum

## PHYS 1251 Lab Manual for Introductory Physics



ECU Department of Physics

Last Revised: May 17, 2019





# Steps to transform a lab

- 1 Evaluate/assess what you have (curriculum and resources)
- 2 Determine what the department wants
- 3 Choose a curricular framework
- 4 Write the curriculum
- 5 Pilot, revise, assess, repeat.



# Steps to transform a lab

- 1 Evaluate/assess what you have (curriculum and resources)
- 2 Determine what the department wants
- 3 Choose a curricular framework
- 4 Write the curriculum
- 5 Pilot, revise, assess, repeat.
- 6 ... and publish too



# Context of transformation

**Courses** General Physics Laboratory I and II.

- Science majors
- Algebra-based intro physics
- Calc-based intro physics

**Scope** Implemented in all sections (10-25 per semester per course)

**Academic Labor** Labs overseen by traditional physics faculty, and in-class work done by Graduate TAs. Lab manager (MWS) handles logistical issues.



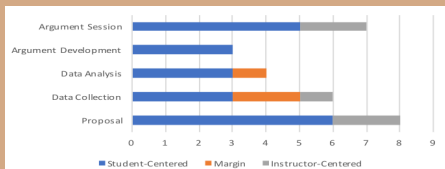
# Instructor Fidelity of Implementation

- At AAPT: Talk AA11 (Monday) and Poster PST2B32 (Wed 10:15-11:00am)
- At PERC: Poster A76 (Wed 4:45pm)

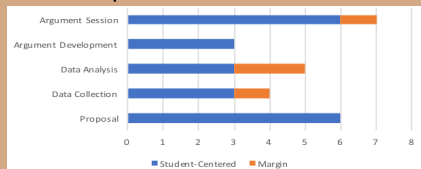
## Instructors matter

We observed instructors during each of the phases of lab and recorded their moves.

### Novice instructor



### Experienced Instructor



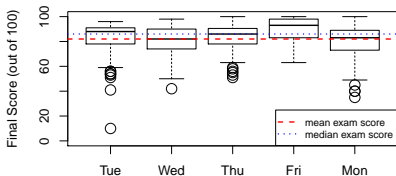
# Assessment of scientific practices in Gen Phys Lab I

- At AAPT: Poster PST1D30 (Monday)
- At PERC: Poster C33 (Thursday 9:45am)

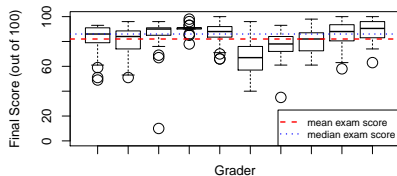
## Assessing Science practices

We gave a practical exam that assesses science practices.

No “leaks”



Need to calibrate the graders



# Thank you!

## Any Questions?



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