Introductory Physics Labs: A Tale of Two Transformations

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Abstract

A key problem facing physics departments, especially given the current global pandemic, is how can we engage students in our laboratory courses while maintaining appropriate social distancing and hygiene standards. One solution to this problem is to move the labs to an online format. But how can we engage our students in online labs with a curriculum that privileges science practices? We have created an intro physics lab curriculum that engages students in science practices and are implementing it online.

1 Introduction

SFW mostly writes this.

Here we set up the rationale behind our initial transformation. I see this as two-fold:

1. We hadn't updated our labs in decades, and they utilized outdated technology and pedagogies.
2. We wanted to give students an opportunity to delve into science practices.

We have been seeking institutional (SFW's Teaching Grant) and national (NSF Award #) resources to support our initial transformation.

Then we've got a pandemic which means online labs were an immediate default. However, a lack of online labs is also a barrier for DE students' completion of a degree. So online lab curricula would fill an institutional need.

2 Instructional Context

SFW mostly writes this.

We should also talk about the specific context of our labs:

- Discuss institutional profile.
  - Students
  - Eastern NC: rural, many communities without high speed internet
  - etc.
- Discuss student population in labs/lecture courses served.
- Compare course demographics with university demographics.

3 Transformation #1: Argument Driven Inquiry

SFW mostly writes this.

Brief lit review of ADI, including some of our prior work (PERC 2019 proceedings paper). Describe the stages of ADI and how we implement them.

4 Transformation #2: Online Adaptation

MWS mostly writes this.

How did we adapt the ADI curriculum to online formats?

- Stage 1: Finishing Spring 2020 semester online

- Stage 2: Fall 2020 and beyond - lab kits

Lab kit composition

5 Conclusion

SFW and MWS write this together.

We did it, and you can too! We should have a resources page/EPAPS for this paper.

6 Notes, not part of outline

Most TPT papers are *short*—on the order of 2000 words. For example the following two papers are 3 and 4 pages respectively:

- https://doi.org/10.1119/1.5145407
- https://doi.org/10.1119/1.5145524

So we don't need to kill ourselves on a long-form manuscript. I think we can turn this around in a month or two and get this out.

Also, while I could see having Joi read this and give us some feedback, I'm not sure she needs to be an author. But this isn't a hard and fast stance that I have, and am willing to discuss with you. More to the point, I'm not sure how much she needs this paper.