October 14, 2021 Education Working Group Call

Attendees: Olivia Tabares, Jason McLachlan, Alyssa Willson, Jody Peters
Regrets: Diana Dalbotten, Shannon LaDeau

Agenda/Notes:

1. Check in about:
    a. Olivia - scripts for teaching R infographic for teaching/learning biostatistics with R Updates.
        i. Olivia has been working on the scripts. Realized need to make them more self explanatory.
        ii. Showed an example of what she has for an Intro to R.
        iii. Has an Introduction to R in Spanish. Shows what kind of companies use R, advantages of learning R, and what they can do in terms of data viz
        iv. Could
        v. Wants to come up with things that are self explanatory. Not sure what is most useful - the slides, the scripts (wondering if it would be useful to have have this in Rmd too?), videos
        vi. From Alyssa - thinks Rmd useful and easier format for students to engage with, but from experience working with students for a biostatistics lab - when students were submitting homework, they had trouble with the scripts. When students didn't have the text boxes already created for them, they struggled
        vii. No right answer because every option has a downside. It depends on where the students are at. If you can get students to feel like they can do it and get them feeling like "I can code" and realizing that they will get to a place where they will have to learn something new like GitHub, Rmd formatting, etc
        viii. Want to make the material accessible, but don't want to hide where the stumbling blocks are at. You are going to end up with stumbling blocks no matter where you start and Rmd is a nice place to start
        ix. Alyssa - read briefing on science education. From that - oftentimes the specific coding language isn't the most important thing for getting students trained, it is the fact that they are learning any coding language or learning how coding language are structured.
        x. With the point about the companies that use R - take a step further - what companies are using coding in general (not necessarily R). Use it as a way to brag about how important coding is no matter what language it is. Once you learn one coding language, other languages are easier to pick up.
        xi. Make the point that R (or environmental data analysis) is a way to help society (this paper focuses on highlighting how science can be used to help society and the environment to recruiting diverse students rather

than focusing how students can get into the field https://www.nature.com/articles/s43247-021-00287-4)

xii. **Olivia's program that she uses to make infographics is genial.ly** - you can create different types of interactive presentations. Easy to put presentations with links, can make games
    - Has basic and paid subscriptions. Olivia thinks the basic, free version has a lot of utility

xiii. Jody will work with Olivia to get her infographics into QUBES

b. Anna - Forecasting, Prediction, Projection Manuscript Update
    i. Check in with Anna on the next call

c. Alyssa - ecoforecasting education dissertation chapter outline
    i. Outline is not completed but I have some updates on related data collection efforts that I'd like to present to the group! :) (link not included as it's a work in progress but I'll share my screen if there's time during the meeting)
    ii. Alyssa's project is focused on summarizing education related activities in EFI, particularly at the undergrad level
        - Want to format paper as a case study
        - Want to have quantitative aspect to it. Have a lot of descriptive material about what we have done, but want to add the quantitative component
        - Data collection is looking at the materials across levels of curriculum
            - Smallest = bite sized material , e.g., videos, vignettes
            - Next level - courses taught on forecasting and modules of those courses
            - Largest - course as a whole that would be used for a degree for ecological forecasting
        - Alyssa is working with an undergrad who is looking through the course catalogs of institutions in US and pulling out courses relevant to ecological forecasting. It is loosely defined, but follows what was listed on the 2-pager Educational Resource pdf.
        - Alysa got list of colleges/universities including 2-year colleges through large public 4-year institutions. Randomized the list and will go through a representative sample
        - First school - have 13 courses
        - Found another school that was defined as 2-year vocational institution which has tons of courses that are relevant to forecasting which was really surprising
        - Approach to all disciplines that make up forecasting is to focus on introductory courses
        - Think this will show that there are other ways to get involved in the community and don't necessarily have to be at a large institutions with experts in forecasting

- Have course title - is there a way of coding those so Intro Stats course would have the same code. This might be too much, but could potentially do a cluster analysis to see if there are types of curricula that cluster by school type or by metrics of diversity, cost, etc. See if there are categories of training that different Americans are getting from different backgrounds or contexts.
- Technical skills vs exposure to science courses. People with a lot of math background can have a hard time getting into forecasting because it is a different way of getting into math.
- Learn where the needs and opportunities are at different educational spectrum
- Alyssa also hoping to use IPEDS database to get more demographic information. Planning to match the institution in Alyssa's database with the institutions in IPEDS. Jody suggested that Alyssa see how the match up with IPEDS works, if Alyssa ends up looking for other databases for diversity metrics, there was a database Diana or Nievita suggested for the NCEDS proposal that Jody can look up the details about and share with Alyssa

d. Jason - Sloan education activities
    i. Working with collaborators at Humboldt State, Salish Kootenai, U of New Mexico, Gallup to develop educational materials that can be used with their students
    ii. Example is conducting data analyses that the tribes use for reporting to the EPA
    iii. Want to be helpful for immediate needs and want to build a more general framework for environmental data science that is inclusive, and want to continue to develop relationships with our collaborators
    iv. Have funding to support a grad student/post doc funding to help work on creating educational materials for 1-2 semester.
        - Want someone who knows R and who cares about teaching
        - Olivia would be interested in this position - will keep talking about the details

2. Didn't get to this on the October call. We'll just leave it on the Agenda as a reference for future calls as a reminder about other tasks to consider prioritizing (and the group can brainstorm other ideas!):
    a. RCN Educational Materials follow ups
    b. Educational module development connected with the Sloan grant
        i. We have Sloan funds for a grad student in the spring. Will be following up with Sloan partners to figure out what topic to pursue, but leaning towards species distribution and how that changes with climate change
    c. Alyssa's paper: 2nd chapter of dissertation focuses on educational resources from EFI and Alyssa's work with the HSU interns and RCN meetings this past

summer - communicate about developing curriculum at different levels and how undergrads can develop a forecasting background with the undergrad degree. Would like input from the group when she has pulled together an outline for the paper

d. What kind of biostats do students need to know to set them up for being able to take a forecasting course?
    i. Notes from today:
    ii. Could be something emerging from Alyssa's paper that provide concrete steps that Jason can incorporate into the Biostats course he teaches
    iii. 2 things students are missing - thinking in terms of distributions and thinking in terms of programmatic coding - is it possible to take the Biostatistics class and incorporate these things. Would need to redefine the intro content for data science/intro stats class
    iv. From Anna's experience - the programmatic codign experience came from repetitiously doing it rather than taking a class. Teaching it is a challenge because it isn't just this is how you do this and there is a right and wrong answer
    v. Stanford has challenge online that provides weekly challenges - something like this would be something that gives people the experience
    vi. Come up with ways to have group projects where everyone participates and have challenge or project based modules to have consistent practice
    vii. Anna's experience with UConn's ecological modeling course - taught by 2 professors, a Bayes and a frequentist so got both perspectives
        - Morgan Tingley - UCLA and Robi Bagchi - UConn
    viii. Previous Notes:
    ix. Jason - provide update on ideas from RCN Steering Committee Call
    x. From Feb 2021 call: How do we make those materials available? Don't want to create a textbook, but could think about an AGU Monograph style resources. 10 chapters that build on each other.
    xi. Go back to the notes from Feb 2021 call for details about this conversation.
    xii. Elva Escobar is interested in participating on this project
    xiii. Here are some ideas that came from a separate call with the RCN Steering Committee.
        - Quinn is trying to think about how to put some of his course materials together. Thinking of perhaps a How To Guide for the forecasting challenge
        - Has anyone seen the Open Forecasting Textbook (does exist as a paperback as well)
            - In the Preface this is for a 3rd year undergrad intro master's course
            - Interesting template. Success in part due to free online and R packages are nicely user friendly

        - This is a bookdown format where R code is integrated and is a living document
        - Wouldn't get the credit of an AGU Monograph, but would be more broadly available.
        - Could do something that are RMarkdowns that could be combined as a book
        - Loop John Zobitz into this. He is also writing a book for his courses. Mike has used some of his chapters in his 300 level course.
        - Do this in the context of NEON data and walking through all the steps of forecasting. Could get long, but would be a nice resource.
        - A self-contained book to walk through. Could reference other books.
    - This sounds like a strong potential for a proposal for NSF Education Directorates, especially if we could bring in an education evaluator who evaluates the open source, collaborative textbook.
        - If we structured it well it could have a strong educational research component

xiv. Disciplinary expertise - think we are downplaying the empirical researchers who are providing data/data collection. Don't want to leave those people out
    - Ecological methods course

xv. Also don't want to leave out people more interested in the social science/partners side of things. But this is where the note up at the top of page 2 will be important to convey that not all courses are necessary.