

## November 18, 2021 Education Working Group Call

October 14, 2021 Education Call Notes [HERE](#)

Attendees: Jason McLachlan, Tadhg Moore, Jody Peters, Alyssa Willson

Regrets: Shannon LaDeau

Agenda/Notes:

1. Check in about:
  - a. Olivia - scripts for teaching R infographic for teaching/learning biostatistics with R Updates.
    - i. Drafts for the R infographics are on QUBES. Once finalizes then they will have DOIs associated with them and be publicly available
    - ii. Learning R Infographic: <https://qubeshub.org/publications/2788/1>
    - iii. Teaching R Infographic: <https://qubeshub.org/publications/2789/1>
    - iv. Olivia wasn't able to make the call, so we will follow up on the next call
  - b. Anna - Forecasting, Prediction, Projection Manuscript Update
    - i. Anna wasn't able to make the call, so we will follow up on the next call
  - c. Alyssa - ecoforecasting course compilation project update
    - i. No major updates -- hopefully to come very soon :/
    - ii. Have data from multiple institutions within each category they have been looking at
    - iii. Starting to think about analyzing the data. Exploratory analyses that will inform the qualitative assessments
    - iv. Want to have very thoughtful analyses and visualizations
  - d. Jason - Sloan education activities
    - i. Want to develop tools/modules for undergrad classes. We will be working on this in the spring/summer
    - ii. Antoinette (U of New Mexico, Gallup) and Georgia (Salish Kootenai College) teach R in environmental undergraduate programs. Would like help with developing R and course materials with the goal to integrate more Native American examples into their classes.
    - iii. Nievita (Humboldt State University) wants to have students she works with to be mentored to prep for research experience
    - iv. Alyssa mentored students at HSU and was able to work with 2 who submitted forecasts to the NEON Forecasting Challenge
      - Spring semester had students from HSU paid for ~5 hours per week. The students watched 2 videos per week from the series on ecological forecasting. Then they wrote a short reflection on each. Each student had individualized requirements. Started with a

baseline and then Alyssa adjusted for each students' strength. The longest response was 500 words. If it was longer then included other additional resources.

- Alyssa read through each student's reflection and tried to make 1 comment on each reflection. Answered questions if students asked any questions and then followed up on misconceptions and provided additional resources to address those misconceptions or misunderstandings.
- If students had additional time beyond their 5 hours, then went back to the additional resources and added those their reflections
- Rarely met with the students because they also had weekly meetings with Nievita that were included in their 5 hours.
- Over summer two students who worked on the project in the spring, worked on a primary research project where they had more time to work on the project.
- The students worked on the Aquatics Forecasting Challenge. Had them understand the null model and then add one thing to the null model that was relevant to dissolved oxygen.
- Neither student had enough R experience to read through the null model on their own so Alyssa worked with them to go through line by line to understand what was going on
- After having done it once - are there ways to make it more streamlined or expand out?
  - Don't compress the timeline. It is a lot for the students to get through in a semester
  - Think students had a hard time with the earlier videos before DA or State Space Modeling. The earlier concepts were sticky. Had to take a step back to explain things like what is a prediction, what is a model, what is uncertainty. So there may be a better way to approach that side of things. There may be better resources to use for these topics.
- Would there be a way to use the Project EDDIE materials to help frame it?
  - Alyssa's goal was to give a conceptual overview of forecasting
  - Think the videos do a good job of that as long as we can
  - EDDIE modules would be most helpful on the second half of the semester
  - Alyssa doesn't think Nievita will want students to do 1 module for week. Need multiple weeks per module

- Conceptual overview - what is forecasting for a ¼, then do some EDDIE modules. The practical aspects of the modules will be really helpful
    - One of Alyssa's students over the summer watched the EFISA videos on how to create forecasts and she thinks that was really helpful for the students, especially if the goal is to produce a forecast by the end of the summer.
  - Thinking more longer term - is there a way to make a formal mentoring program?
    - Could think about things like forecasting clubs where people do not need to be at the same institution
    - Students get funding for starting clubs. Don't know if there would be a way to pay an honorarium for grad students to be advisors. Wouldn't be that much, but also wouldn't be that large of a commitment for grad students
    - Could also think about peer mentoring by undergrads
    - ND has the Biology Leadership Club. Alyssa was asked to talk about statistics for that group and got a small gift card. This could be a good way to promote peer mentoring and graduate student mentoring.
- e. Open Book Idea (see point 2.d.x. below) - Shannon is interested. There is potential to use the educational materials developed for the Sloan grant to start providing content for this that other EFI members could contribute to
- i. Mike's book is accessible after a certain point, but is there another text book to get to this point? Want an intro stats book that points towards forecasting. This is something this open book could provide.
  - ii. Could think about coming up with a topics to cover and structure and then open it up to the EFI community. Could also be something to work on during the unconference time at the All Hands May 2022 Meeting
  - iii. Thinking about how to use data is important
    - 2 books that came up in the discussion
      - [Thinking Clearly with Data: A Guide to Quantitative Reasoning and Analysis](#)
      - [Living in Data](#)
- f. Jody's Recap from a recent community call with QUBES
- i. See notes from that call [here](#).
  - ii. Education modules could be posted as QUBES resources and then those could be compiled into a Series (here is an example of [a series](#)). Then the series could be submitted as a course in Course Source which is peer reviewed and part of QUBES

- iii. Can use QUBES as a VM to use in classes with R and Jupyter notebook, details here: <https://qubeshub.org/software>
  - iv. Does anyone have experience with [SIMIODE](#)?
    - QUBES is partnering with SIMIODE and it seemed like an organization that could be useful to connect with
    - SIMIODE is a community of practice focused on a modeling first method of teaching differential equations
    - Will have Expo in February
2. Leaving this 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.