

## July 13, 2022 Education Working Group Call

Attendees: Anna Sjodin, Alyssa Willson, Antoinette Abeyta, Jason McLachlan, Jody Peters

Agenda/Notes:

1. Educational Priorities Identified in [the Strategic Plan](#) from the EFI Steering Committee
  - a. Categories
    - i. Quick Wins - high priority, low effort
    - ii. Major Projects - high priority, high effort
    - iii. Fill In - low priority, low effort
    - iv. Backburner (Luxuries) - low priority, high effort
  - b. Objectives
    - i. Transform the Science (Sci)
    - ii. Improve Environmental Decision Making (Dec).
    - iii. Create a Collaborative Community (Com).
    - iv. Increase Diversity, Equity, and Inclusion (DEI).
    - v. Improve EFI's Governance and Sustainability (Gov)
  - c. Tasks Aligned with EDU Group
    - i. Compilation of Educational Resources - Quick Win
    - ii. Undergrad Training Modules - Major Project
    - iii. Undergraduate Curriculum - Back Burner
  - d. Point of the Strategic Plan is to have the SC provide vision for EFI, but it is a two-way street. Working Groups can come back to the SC with additional ideas. It is not a mandate for the Working Group - each group can work on their own priorities, but we want the Working Groups to know about the Strategic Plan in case it helps provide direction
2. Updates on STC and Sloan Proposals
  - a. In the fall after STC and Sloan proposal go in, have workshop at GA - reflect on the Strategic Plan and how things went over the summer to prioritize or revise tasks
  - b. Both due at the end of the summer
  - c. Sloan - builds on what we have been doing with the current Sloan funding. Major addition is the connection with AIHEC (American Indian Higher Education Consortium) which will allow us to share teaching modules with 37 Tribal Colleges and Universities
  - d. There is a new grad student at ND is helping Jason prep for the GA workshop - a 1 day workshop on forecasting and a 1 hour workshop focused on forest changes
  - e. Have 20 people signed up for the 1 day workshop. Undergrads, land managers, professors
  - f. STC - preproposal didn't have any negative feedback for the education section, so the full proposal will be similar
  - g. New connection - Ryan Emanuel from Duke

3. Ethics in Forecasting Project Updates
  - a. Abby and Olivia had a chance to connect about ideas. They weren't available to give an update on the call, so we'll follow up on the next call
  - b. Jason and Abby also previously talked about adding an example about environmental justice with what Jason has put together with Georgia Smies at Salish Kootenai College and
  
4. Antoinette's learning goals and concepts - brainstorm case studies
  - a. Have Syllabus for Environmental Science course for UNMG
  - b. Goal is to have students have basic understanding of environmental science issues. Students go into 1 of 2 tracks. Geochemical - focused on water quality. Or go towards a policy driven track. Critiques of both tracks
  - c. Antoinette has been working through SERC's resources to identify what students need to do.
  - d. Want to have the input for the data science activities that are accessible. Estimated that 30-40% of students don't have high speed access off campus. Computer labs don't allow software to be downloaded. So how to design a class that provides
    - Focus on concept of data science
    - Planning to do the analyses in excel because it works offline and is available to all the students at UNMG and works well on the mobile app without
    - Jupyter is available, but it is glitchy and crashes often
  - e. Identified the core goals in 1.2b
  - f. Looking at children's curriculum - children's Python curriculum. Need to change the context from robots to environmental issues
  - g. Have some examples ready to go
    - i. Water quality, climate change, earthquakes
    - ii. Time series, Monte Carlo simulations
  - h. Make sure to incorporate this into the STC and Sloan
  - i. Basics of coding is presented at a bunch of levels. Can use the children oriented code with a college level example that is relevant to the community. This takes work, so how can we help Antoinette do the work
  - j. Use a 2x2 matrix on priority/difficulty level (high priority, easy to do vs low priority hard to do)
  - k. The biggest challenge right now - think about things students can do in line and what they can do at home
    - i. What is data and where does it come from - think this is really important to include and isn't something that is included in the modules that Antoinette has gone through
    - ii. There could be interesting examples - golden eagles, water quality
    - iii. This is what Project EDDIE is interested in - wanting to have examples that are culturally relevant

- iv. Georgia has the same questions about data collection in her class. If you had a secret model underneath that is generating data. Then ask students to make decisions about where to collect. And can show how the data changes depending on the decision the student makes for where to collect data.
  - v. Things that seem important based on the book club book: data collection is driven by your question and hypotheses, which can be biased. Make sure the data actually measure your goal, Proxies can be problematic, bad data make a bad model, even if the maths of the model are good.
  - vi. Decisions for where to collect data involve values and priorities and will change depending on who is collecting the data
  - vii. Can talk through scenarios (don't need code) and have exercises about the consequences of those choices. Connect this with exercises in excel and allow students to graph and see how choices change thing
  - viii. Also what to do about qualitative data? Starting with quantitative data for now since that is a big topic
  - ix. Want the excel to mimic what would be done when coding
  - x. For Monte Carlo example - use antibacterial example and have students roll dice to show the probabilities. Want to create activities that show the basic concepts so that if they do go into a data science specific class that they won't come at it from a place of absence
  - xi. Can develop a more advanced coding class that builds on the examples
  - xii. Not sure what model can be modified that can be fit to meet the learning goals.
  - xiii. Have a lot of examples that are geology based, but have issues with times scales that are different from environmental examples
  - xiv. Good to have list of the breadth of topics
    - How to balance staying on the same topic to keep continuity vs going across topics to provide multiple examples
  - xv. As developing think about how useful is this for UNMG and how can we make it generalizable to share more broadly
5. Olivia's Population Ecology Class - Olivia wasn't available so we can catch up on the next call
  6. Alyssa - Ecoforecasting Educational Resources and Gaps Manuscript
    - a. Hoping to get the comments resolved in the next day or so
    - b. Will reach out to Kira to get some input about the social science component
    - c. Will look into archiving a pre-print
    - d. Hope to submit soon
  7. Anna - Forecasting, Prediction, Projection Manuscript
    - a. No update since the last call

8. Forecasting Ethics material (Jody is leaving this in the notes for reference)
  - a. Here is an overview of what was developed: start with a think-pair-share to discuss the [Ecological Forecasting Ethics: Lessons from Covid-19](#) post in Dynamic Ecology. This would then be followed by 3 topics presented in the post, 1) uncertainty, 2) unintended consequences and conflict of interest, and 3) sins of omission vs commission. The material provides a hypothetical ecological example with questions and real-world examples/news stories. There are also a couple of examples of further readings and suggestions for the next steps forward.
  - b. Idea from Mike on Slack: One other thing we always talk about in my class when we cover forecast ethics (and which might build well off the "sins" example in the slide deck) is the question of which forecasts should be public goods and which are appropriate for private investment. If all forecasts have to be public goods, there will be a lot less forecasting and possibly less innovation than if the private sector invests, but on the flip side there may be forecasts where there's a moral obligation to disclose the prediction to everyone.
  - c. Update from Abby: I actually put a bit of work into this last semester and drafted the start of a formal resource that we could publish
  - d. The core group that worked on this project (Abby, Sydne, Ryan, Quinn) were potentially interested in trying to publish it at Teaching Issues in Ecology and Evolution. Sydne had suggested this journal, but Abby is open to others. Think about putting it up on QUBES to get DOI, but make sure that uploading to QUBES won't affect submission to a journal.
    - i. Looking for people to help write one of the examples. If there are 1-2 people who are motivated this can be helpful. Abby can't work on this for the next 2 weeks
    - ii. If anyone is teaching an interested in trying this out, or reviewing it from a pedagogical perspective
    - iii. Short workshop during EFI meeting to walk through as a group as an activity or collaboratively write one of the case studies. Is there anyone in the education group willing to lead this?
      - Talk about discussion questions for each case study
    - iv. Sydne is happy to provide some rubrics for assessment of student learning to this document once the examples are nailed down
    - v. Jason willing to include in his course next fall
  - e. Is there a model that was connected to the example?
  - f. Put in context about decisions people are making about the model have ethical challenges that people need to consider
  - g. Could talk to Georgia about the drinking water example and check in with Abby to see. Would be a nice one to emphasize that the communities affected by

environmental decisions - how are they involved with the decisions that are made.

9. Open Book Project to keep in mind and mash up of notes from previous calls
  - a. There is potential to use the educational materials developed for the Sloan grant or with Olivia's class to start providing content for this that other EFI members could contribute to.
    - i. This is a book you would read before you read Mike's Forecasting book
    - ii. If we start to develop modular materials they could be included in such a book
    - iii. Can start to develop a list of the components that would be useful to include in a book and think about how to make it applicable to a wide range of students from many different backgrounds
    - iv. Think about developing slides/materials that provide context
    - v. Running list of who has expressed interest at one time or another
      - Jason McLachlan, Shannon LaDeau, Elva Escobar
    - vi. 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 something like 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.
    - vii. 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