Next Generation Science Teacher Preparation

- NSF grant to redesign introductory biology [expanded to chemistry] for future K-8 teachers and evaluate effectiveness (Linton, MacDonald, Tomasik)

  - Student-Centered Class (active learning) focused around NGSS disciplinary core ideas and crosscutting concepts

  - Inquiry-Based Labs emphasizing NGSS scientific practices applied to core ideas

  - Introduction to Pedagogy
Life Science for Elementary Teachers Laboratory

Includes Use of Natural History Collections
Life Science for Elementary Teachers Laboratory

- Incorporates specimens from the museum and herbarium
Life Science for Elementary Teachers Laboratory: Intro to Pedagogy

• Lesson – Designing Field Trips for K-8

• Assignment – “Mini” Lesson

- Students visit the museum on their own

- Identify one NGSS standard that could be addressed on a field trip to the museum

- Write one learning objective, one assessment, and one activity to address that standard on a field trip to the museum
Life Science for Elementary Teachers Laboratory

- In Development... full lab to be held at the museum

- “Evidence of Evolution”

- Student-derived hypotheses

- Measurements and comparisons
Elementary and Secondary Science Methods

Science teaching methods courses tour the museum and learn about educational resources available to them as teachers

- Integrated Science Elementary and Secondary
- Biology Secondary
- plans to expand to all elementary majors

Students design a full lesson incorporating a field trip to the museum
- Based on NGSS standards
Biodiversity Literacy in Undergraduate Education
Introductory Biology for Bio Majors @CMU

BIO 111 – Foundations of Evolution and Diversity

BLUE:
Anna Monfils, Curator of Herbarium
Molly Phillips, iDigBio
Libby Elwood, WeDigBio
Me

Coevolution Module using iDigBio and GBIF digitized data [module workflow]
More Modules and Workshops Planned
Start here

1. Establish Learning Objectives
   - Objectives should include both science content and skills.
   - Considerations: Can these objectives be addressed by established curated datasets?

2. Scale up and disseminate
   - Re-evaluate and improve lesson
     - Re-evaluate and improve lesson
     - Repeat as needed

3. Evaluate the module with a pilot run
   - Include: an instructor who didn’t help develop the module, direct pre and post-measures of student performance on the learning objectives

4. Identify Assessments
   - What student product(s) would provide evidence that students had met the objectives?
   - Brainstorm the types of activities that would help students gain the skills and knowledge necessary to successfully complete these assessments.

5. Design and write up the Activity being cognizant of:
   - duration of class
   - access to technology and data
   - Considerations: Could/should students contribute to the community via an online platform and/or submit their findings to an online knowledge base?

6. Considerations: Include appropriate level of inquiry, formative and summative assessment, reflection/metacognition, adequate scaffolding for instructors and students, class discussion of results

7. Gather background information including peer-reviewed research on the topic
   - Could/should scientists curating the data sources consult during activity/module development?
Digitized NHC data in K-12 classrooms?

- Excellent alignment with NGSS
  - All Scientific Practices
  - Cross-cutting Themes: Systems, Scale, Stability and Change, Patterns
  - Disciplinary Core Ideas in Biology: Ecosystems and Evolution