Deb Linton

Improving Science Teaching

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)

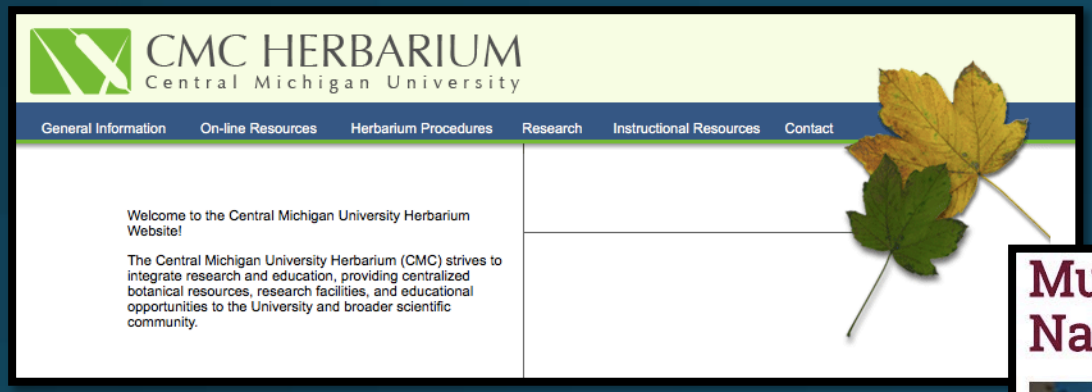
  - Student-Centered Class (active learning) focused around NGSS disciplinary core ideas and crosscutting concepts

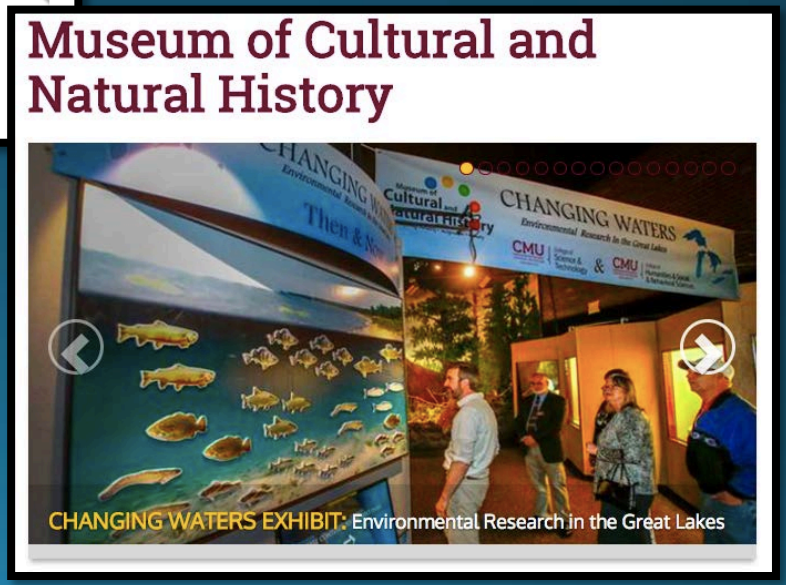
  - Inquiry-Based Labs emphasizing NGSS scientific practices applied to core ideas

  - 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

BLUE

Biodiversity Literacy in Undergraduate Education

Biodiversity Literacy in Undergraduate Education

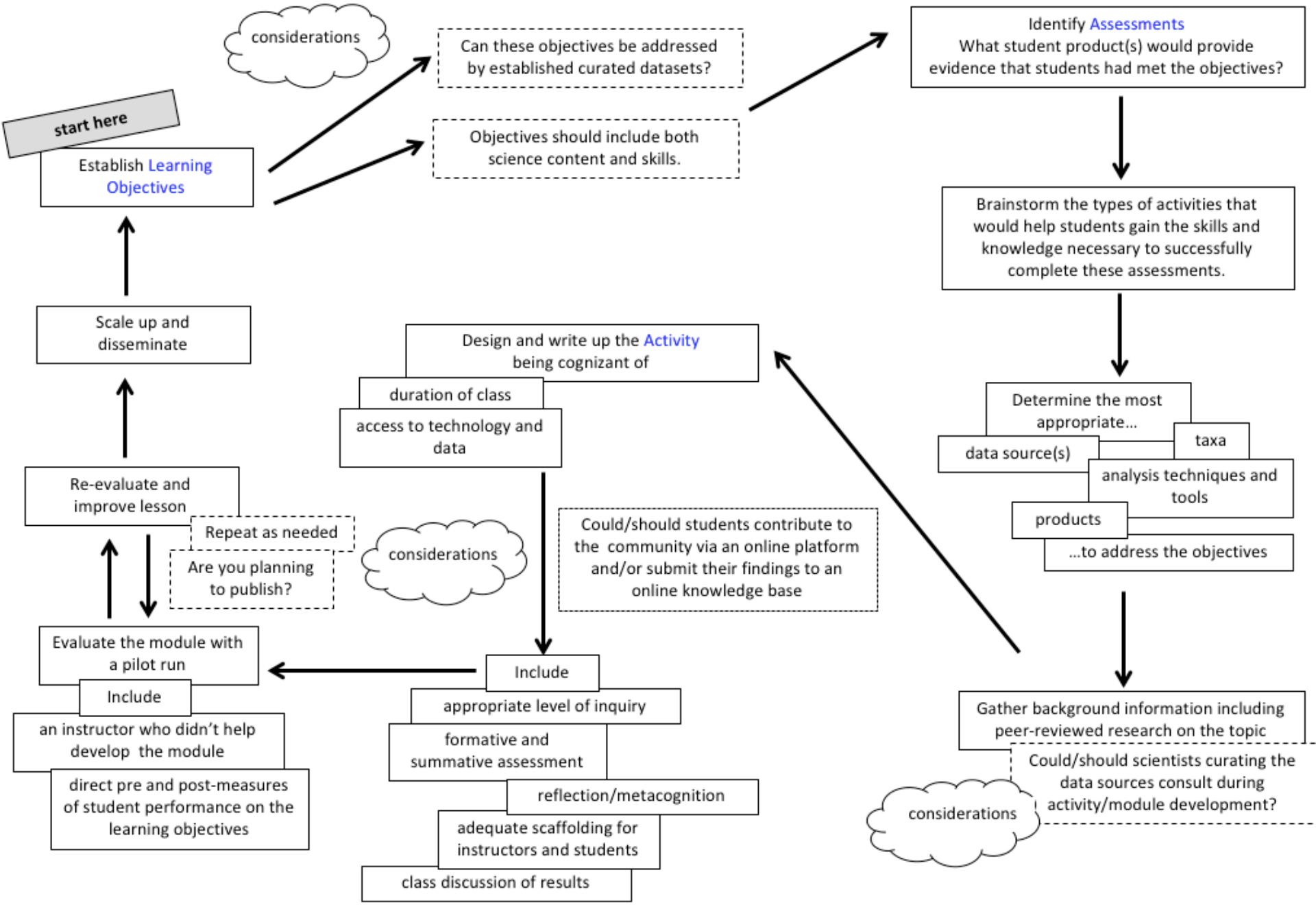
Introductory Biology for Bio Majors @CMU

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
Establish Learning Objectives
considerations
Can these objectives be addressed by established curated datasets?
Objectives should include both science content and skills.
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.
Determine the most appropriate…
data source(s)
taxa
analysis techniques and tools
products
…to address the objectives
Gather background information including peer-reviewed research on the topic
considerations
Could/should scientists curating the data sources consult during activity/module development?
Design and write up the Activity being cognizant of
duration of class
access to technology and data
Could/should students contribute to the community via an online platform and/or submit their findings to an online knowledge base
Include
appropriate level of inquiry
formative and summative assessment
reflection/metacognition
adequate scaffolding for instructors and students
class discussion of results
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
Re-evaluate and improve lesson
Repeat as needed
Are you planning to publish?
considerations
Scale up and disseminate

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