Collecting Measures of Success: Metrics for Collections Symposium

34th Annual meeting of the Society for the Preservation of Natural History Collections, Chicago, IL

Measuring Success for Collections: Educational Products and Outcomes

Anna K. Monfils, Central Michigan University
Molly Philips, iDigBio, University of Florida
Libby Ellwood, La Brea Tar Pits and Museum
Debra Linton, Central Michigan University
Lisa White, University of California Museum of Paleontology
Education is a critical aspect of the national digitization effort

- CollectionsWeb RCN
- Network Integrated Biocollections Alliance (NIBA)
- Advancing the Integration of Museums into Undergraduate Education (AIM-UP!)
- NSF Advancing the Digitization of Biological Collections (ADBC)
- Integrated Digitized Biocollections (iDigBio)
- Biodiversity Collections Network RCN (BCoN)
How to make a scientist's head explode:

**Anecdotal evidence isn't valid.**

Yes it is! I once used an anecdote as evidence, and later it turned out I was right!
2014 Survey of Students Working in Natural History Collections
Students in NHC Collections: Outcomes

• Students working in collections are:
  – Performing high order curatorial tasks
  – Critical to curation and digitization
  – Expressing increased understanding of the nature of science
  – Indicating collections based experience is influencing their undergraduate experience, course/major selection and graduate school plans
Students in NHC Collections: Opportunities

• Potential to optimize undergraduate experience by increasing:
  – Exposure to research
  – Interactions with internal/external researchers
  – Professional development opportunities
  – Training in all aspects of collection science
2015 ASSESSMENT OF COMMUNITY NEEDS AND EXISTING RESOURCES IN NATURAL HISTORY COLLECTIONS BASED SCIENCE EDUCATION

Biodiversity Collections Network

iDigBio
Integrated Digitized Biocollections

Aim-up!
Advancing Integration of Museums into Undergraduate Programs

BLUE
Biodiversity Literacy in Undergraduate Education
Community needs and existing resources in natural history collections based science education

I. Integrate various efforts and centralize resources to efficiently use time and effort
II. Incorporate biology educators
III. Develop meaningful undergraduate research experiences incorporating specimen curation continuum and data lifecycle
IV. Provide best practices for mentoring student workers in natural history collections
V. Develop, assess, and refine educational modules involving natural history collection data
VI. Disseminate/propagate materials
   i. Introduce modules in educational venues (education conferences and journals)
   ii. Incorporate partners
   iii. Train the teachers
   iv. Incorporate in textbooks and on-line resources
Goals of the BLUE Data Network

• Cultivate a diverse and inclusive network of biodiversity researchers, data scientists, and biology educators
• Build community consensus on core biodiversity data literacy competencies.
• Develop strategies and exemplar materials to guide the integration of biodiversity data literacy competencies into introductory undergraduate biology curricula.
• Extend the network to engage a broader community of undergraduate educators in biodiversity data literacy efforts.
Defining Biodiversity Literacy and Core Competencies

Digital Data in Biodiversity Research Conference

4DEE

Biodiversity NEXT

Building a global infrastructure for biodiversity data. Together.

22 – 25 October 2019
Main Conference
20 – 21 October 2019

Advancing the Introductory Biology Experience

A conference to develop a unified vision for undergraduate introductory biology

Presented by the National Association of Biology Teachers
August 7-9, 2019
Howard Hughes Medical Institute, Chevy Chase, Maryland
Creating Open Education Resources

Biodiversity Literacy in Undergraduate Education

Resources

Movement: Nature's Flying Machines
Blake Cahill, Anna Montils, Debra Linton
Version: 1.0
- citizen science, quan… 16 16 P 0 04.23.2019
- data in the classroom… 110 27 P 0 04.12.2019

Data is the New Science
Anna Montils, Debra Linton, Libby Ellwood, Molly Phillips
Version: 1.0
- data in the classroom… 80 9 P 0 04.09.2019

Following the Data
Anna Montils, Debra Linton, Molly Phillips, Libby Ellwood
Version: 1.0
- data in the classroom… 80 9 P 0 04.09.2019

Amphibian Diversity: Species Richness and Precipitation
Debra Linton, Anna Montils, Molly Phillips, Libby Ellwood
Version: 1.0
- data in the classroom… 84 18 P 0 03.19.2019

Species Range Over Space and Time
Debra Linton, Anna Montils, Libby Ellwood, Molly Phillips
Version: 1.0
- data in the classroom… 49 12 P 0 03.19.2019

Liberating Data for Biodiversity Research
Libby Ellwood, Austin Mast
Version: 1.0
- Lab, Teaching materials… 49 19 P 0 03.19.2019

https://qubeshub.org/community/groups/blue_data/blueresources
Student and Instructor Resources

Description

Movement is a key function required for the survival and reproduction of organisms. Microorganisms, such as bacteria and unicellular protists, achieve movement via cellular structures such as cilia and flagellae. Plants and fungi are incapable of individual locomotion but can disperse their offspring via seeds and spores and can grow towards or away from environmental stimuli. Animals have evolved a multitude of methods for movement in terrestrial, aquatic, and aerial environments. One of the most successful types of animal locomotion is flight. Flight has evolved at least four separate times, in the insects, pterosaurs, birds, and bats. Flying animals have a diversity of body forms and aerial abilities. They can teach us a lot about form and function. In fact, scientists study animal flight to develop flying robots, airplanes, and rocket ships. In today's lab, you will investigate the forces involved in the form and function of flight in birds and insects.

Students completing this module will be able to:

- Explain the forces acting on flight.
- Describe how lift is created by wings.
- Compare how antagonistic muscles (flexors, extensors) power flight in animals with endoskeletons and exoskeletons.
- Discuss how wing morphology (form) relates to flight ability (function).
- Evaluate the impact of body mass and wing morphology on bird migration distance.
Citation with DOI

Cite this work
Researchers should cite this work as follows:


BibTex  |  EndNote
Data Usage

BLUE Resources on QUBES

Publications » teaching material Movement: Nature's Flying Machines » Usage

Movement: Nature's Flying Machines
published May 23, 2019 in Teaching Materials

<table>
<thead>
<tr>
<th></th>
<th>Current month</th>
<th>Previous month</th>
<th>Total to date*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>May 2019</td>
<td>Apr 2019</td>
<td>since May 23, 2019</td>
</tr>
<tr>
<td>Pageviews</td>
<td>50</td>
<td>0</td>
<td>50</td>
</tr>
<tr>
<td>Accesses</td>
<td>20</td>
<td>0</td>
<td>20</td>
</tr>
</tbody>
</table>

*since May 23, 2019
Facilitating Broad Scale Implementation

Undergraduate Biology Education Research
Gordon Research Conference

Achieving Widespread Improvement in Undergraduate Education
June 23 - 28, 2019

5th Life Discovery – Doing Science Biology Education Conference
Microbiomes to Ecosystems: Evolution and Biodiversity Across Scale, Space and Time
March 21-23, 2019 Gainesville, Florida
Vision and Change*
Strategies for Change Action Item
A Community of Practice

“Faculty must engage in regular conversations and peer-to-peer mentoring about teaching and learning, and improve, test, and share their own understanding of how students learn. “

Small Collection Symposium, Boise, ID 2014

Connecting Students to Citizen Science and Curated Collections

STUDENTS CONTRIBUTING TO OUR UNDERSTANDING OF GLOBAL BIODIVERSITY

What?
Learn about plant systematics and collecting in the context of our information-rich digital age. Connect physical plant specimens to citizen science observations and online herbarium databases. Explore how making these connections helps contribute to our understanding of global biodiversity.

Why?
This project will help prepare you to be an information-literate scientist, with an understanding of what biological collections data represent, where they come from, and how they can be used.

How?
You will complete this project through a combination of traditional plant taxonomy instruction, participation in citizen science, and exposure to online databases.

The content on this website is the product of a collaborative effort initiated by the North American Network of Small Herbaria Interest Group. Contributing authors include Erica R. Kriemel (UC Berkeley's Sagehen Creek Field Station), Debra L. Linton (Central Michigan University), Travis D. Marsico (Arkansas State University), Anna K. Morellis (Central Michigan University), Ashley B. Morris (Middle Tennessee State University) and Brad R. Ruhfel (University of Michigan). © 2019

This page has been visited 44562 times.
2019 BLUE Faculty Mentoring Network and BLUE Scholars

Fall 2019 BLUE FMN

Overview

- data in the classroom
- museum collections
- natural history collection
- Querying databases

ABOUT THE GROUP
Public Description

Biodiversity Literacy in Undergraduate Education (BLUE), in partnership with iDigBio (via the Education and Outreach Working Group), and Quantitative Undergraduate Biology Education and Synthesis (QUBES), is pleased to offer a unique networking and professional development opportunity for teaching faculty interested in incorporating real natural history collections data into their lessons and data literacy skills into their curricula. Anticipated involvement runs from August through the fall semester of 2019.

https://qubeshub.org/community/groups/blue2019
Acknowledgements

- Biodiversity Literacy in Undergraduate Education (BLUE)
- Teresa Mourad, Ecological Society of America
- Shari Ellis, iDigBio and Assessment
- AIM-UP! Network Participants
  - J. Cook, S. Edwards, S. Ickert-Bond, & E. Lacey (NSF 0956129)
- iDigBio Education and Outreach Working Group, Small Collections Network, and WeDigBio
  - L. Page, L. Fortés, B. McFadden, G. Riccardi, & P. Soltis (NSF 1115210)
- QUBES
  - NSF 1346584, 1446269, 1446258, & 1446284
- Kurator
  - J. Hanken & B. Ludaescher (NSF 1356438 & 1356751)
- CollectionsWeb
  - L.A. Prather, H. Bart, M. Blackwell, & J. Woolley (NSF 0639214)
- Biodiversity Collections Network (BCoN)
  - R. Gropp & A. Bentley, (NSF 144178)
- Quantitative Undergraduate Biology Synthesis Community
  - Donovan, S., Eaton, C.D., Gower, S.T., Jenkins, K.P., LaMar, M.D., Poli, D., Sheehy, R. & Wojdak, J.M. (NSF 1446258)
Biodiversity Literacy in Undergraduate Education

Biodiversityliteracy.org
BLUE-L@LISTS.UFL.EDU
@BiodiversityEd
http://tinyurl.com/bluecontact
Metrics

How do you show your impact?
Who is your audience?

- Learning outcomes through vetted surveys (evidence)
- Dollars affiliated with
- Undergraduate researchers and paid students
- Courses served (note disciplines)
- Demographics
- Number
- Student outcomes
- Jobs requiring skills that
- Affiliations (number of letters of support)
- Website hits
- Affiliated institutions/initiatives
- Records of mentions for Education and Outreach
- Training (Ecology Education Scholar/Blue Scholar)
- Letters from institutions
- Service to national initiatives
- Presentations (with student authors)
- Site your collection!!!!
- Publish your datasets
- Numbers all the time!!!!
- Engage Community of Practice (RCN-UBE)