Variants in Biology Education: What can we learn from pandemics?

8th LIFE DISCOVERY—DOING SCIENCE
Biology Education Conference

March 23 - 25, 2023
Florida A&M University,
Tallahassee, Florida

Organized by:
Ecological Society of America
Botanical Society of America
Society for the Study of Evolution
Society for Economic Botany

A project of the
LifeDiscoveryEd Partners
The Ecological Society of America is proud to be a lead organizer of the

Life Discovery—Doing Science Biology Education Conference

Advancing Quality Ecology Education & Broadening Participation in Ecology

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In an effort to conserve resources, we have not printed session descriptions as part of the program.
You can view full session descriptions at the registration desk or view them online esa.org/ldc

Twitter feed: #LDC2023

Conference Planning Committee

Warren Sconiers, University of Colorado (chair)
Rosny Jean, Florida A&M University (co-chair)
Rhea Esposito, National Ecological Observatory Network (NEON)
Phil Gibson, University of Oklahoma, Botanical Society of America
Jennifer Hartley, Botanical Society of America
Richard Kliman, Cedar Crest College, Society for the Study of Evolution
Vanessa Koelling, Auburn University at Montgomery, Society for the Study of Evolution
Paul Strode, Science Teacher, Fairview High School, Boulder CO

Conference Partners
Many thanks to our Conference Collaborators who promoted the conference to their professional networks:

American Indian Higher Education Consortium (AIHEC)
American Indian Science and Engineering Society (AISES)
American Geophysical Union (AGU)
American Institute of Biological Sciences (AIBS)
American Society for Microbiology (ASM)
Biodiversity Literacy in Undergraduate Education Data Initiative (BLUE)
BioQuest
Cary Institute of Ecosystem Studies
Data Nuggets
Ecological Research as Education Network (EREN)
Entomological Society of America
Integrated Digitized Biocollections (iDigBio)
Florida A&M University Sustainability's Institute
National Association of Biology Teachers (NABT)

Ecological Society of America staff

**Teresa Mourad**, Director of Education and Diversity Programs

**Jessica Johnston**, Education Programs Manager

**Max Murphy**, Education Intern, Fall 2022

**Edwin Solis**, Education Intern, Fall 2022

Join Now!
The Botanical Society of America

Connect
...and engage with plant biologists and educators around the globe

Advance
...your career by publishing your research in the American Journal of Botany, Plant Science Bulletin and APPS

Enrich
...your life and lives of students worldwide through online mentoring in the award-winning PlantingScience program
Friday Keynote Speaker

**Friday, March 24, at 8:00 AM, Grand Ballroom (Room 106)**

**Dr. Victor Ibeanusi** is the Dean of the School of the Environment at Florida A&M University. He is also the Founder and Editor-in-Chief for the International Journal of EnergyWaterFoodNexus. His current efforts include leading and advancing the EnergyWaterFoodNexus (EWFN) initiative as a new science enterprise addressing the vexing challenges set by global climate change that is impacting access to safe water, procurement of sustainable energy, and food security. He seeks transformative innovation built on open science with integration of novel applications and new technologies towards a truly disruptive and accelerated transformation to sustainable development.

Saturday Keynote Panelists

**Saturday, March 25th at 8:00 AM, Grand Ballroom (Room 106)**

**Dr. Heather Lanthorn** is the co-Director of the Mercury Project at the Social Science Research Council, and an affiliate at the Busara Center for Behavioral Economics and the Dignity Project. She holds a ScD in Global Health and Population, an MPH in Health Behavior, and a BA in Medical Anthropology. The Mercury Project is a consortium of researchers working around the world to find cost-effective and scalable interventions that build vaccine demand and support science-based health decision making. The work of the consortium will provide a foundation for data-driven interventions, programs, and policies enabling the creation of a healthier information environment.

Keynote Panelists

**Saturday, March 25th at 11:45 AM, Grand Ballroom (Room 106)**

**Dr. Brenda Spencer** is the Director of the Undergraduate Student Success Center at Florida A&M University. Dr. Spencer is a native of Tallahassee, Florida. She received her bachelor’s and master’s degrees from FAMU and a Ph.D. in higher education administration from Florida State University. Dr. Spencer has extensive experience in student success programming and counseling students with academic, personal, and career issues. She is a member of the National Association of Student Personnel Administrators (NASPA) and the Association of College and University Housing Officers-International (ACUHO-I), among other professional organizations. Dr. Spencer is also actively involved in various educational and service efforts within the Tallahassee community.

**Dr. Tamara Basham** is a professor of Environmental Science at the Collin County Community College Plano Campus in Plano, Texas, north of Dallas. In addition to teaching Environmental Science courses and working with students on independent research projects, Tamara works to promote Universal Design for Learning (UDL) and Diversity, Equity, and Inclusion (DEI) guidelines and methodologies within her institution. Additionally, she has collaborated with fellow BioQuest/ QUBES community members to advocate and work for the inclusion of Social Justice issues in STEM curricula. Over the years, she has found that open, honest communication, power sharing, and kindness are keys to improving student success.
The silent pandemic of antimicrobial resistance  
| Room: 106, Grand Ballroom  
Ashvini Chauhan, Florida A&M University  
Ashish Pathak, Florida A&M University  
Audience: Undergraduate Lower Division  
By the year 2050, multiple drug-resistant (MDR) bacterial infections will cause more deaths relative to cancer. This presentation will focus on structure and functions of microbiota within former nuclear weapons production facilities that remain contaminated with heavy metals. Discussions will facilitate ideas to mitigate a bacterial pandemic that may be the next global pandemic. These research findings can be used as a pedagogical tool and in the context of citizen science activities.

Iterative assessment for evaluating the dynamics of understanding evolution | Room: SGA 100  
Andrew Martin, University of Colorado  
Spencer Buck, United States Air Force  
Audience: Undergraduate Lower Division  
This discussion focuses on variation in student understanding of evolution over time revealed by implementing and analyzing a free-response assessment multiple times in a semester. The approach combines learning theory, a discovery framework from AI research, and multivariate methods of analysis from ecology to reveal student pathways of understanding.

Lesson Plans and Lessons Learned from the Network of Conservation Educators and Practitioners | Room: 104C  
Suzanne Macey, American Museum of Natural History  
Audience: Undergraduate Lower and Upper Division  
The pandemic is challenging us to rethink teaching and learning. The Network of Conservation Educators and Practitioners (NCEP) latest issue of Lessons in Conservation focuses on educators’ reflections and active learning resources for both in-person and online.

Agriculture Undergraduate | Room: 104B  
Monica Burr, Alcorn State University  
Adam Kay, St. Thomas University  
Audience: Undergraduate Lower & Upper Division  
Growing attrition from STEM majors is occurring in part because content and activities can seem disconnected from real-world challenges. I will describe a network making undergraduate biology education more tangible through engaging programming using urban agriculture as a model.

The Challenges and Opportunities of Teaching Pandemic Mismatch, Ignorance and Plurality | Room: 106, Grand Ballroom  
Richard Schulterbrandt Gragg III, Florida A&M University  
Almondo Morain, Florida A&M University  
Hannah Lowenthal, Florida A&M University  
Audience: Undergraduate Upper Division & Graduate  
The purpose of this workshop is to share how, culturally relevant and responsive, Covid issues and answers were addressed and delivered in a combined course of undergraduate: upper division and graduate environmental science students.

Preventing pandemics: an interdisciplinary introduction to academic writing and collaboration | Room: 104B  
Miranda Welsh, Duke University  
Audience: Undergraduate Lower & Upper Division  
This project-based, first-year undergraduate course uses the topic of epidemics to illustrate the value of interdisciplinary approaches to complex problems. Student teams investigate contemporary epidemics from several disciplinary perspectives to develop skills in literature research, academic writing, and collaboration.

Case Study Student Project Framework: Genomic Surveillance of SARS-CoV-2 Variants | Room: SGA 100  
Maria Stanko, New Jersey Institute of Technology  
Audience: Grades 9-12, Undergraduate Lower Division  
Presentation of a framework for a scaffolded 'research' project designed for a large introductory biology class. In the primary example presented, students predict new SARS-CoV-2 variants of concern, requiring application of concepts and skills (mutation, gene expression, graphing, writing) to current events.

Uncovering Hidden Figures of Natural History Collections Using Digital Data Sleuthing & Storytelling | Room: 104C  
Molly Phillips, BioQUEST  
Audience: Undergraduate Lower & Upper Division  
In this presentation we will introduce a series of modules meant to train the next generation of scientists to be data sleuths and storytellers, engaging learners in authentic research experiences within a social justice framework using open tools and resources.
Course-based Undergraduate Research Experience for Students Under-represented in Biology (CURESUB) | Room: 104C
Prabir Mandal, Edward Waters University
Anita Mandal, Edward Waters University
Audience: Undergraduate Upper Division
Course-based undergraduate research experiences (CUREs) are increasingly common because they engage students in research at schools that lack substantial research infrastructure or simply can not accommodate large populations in internship-style research. At Edward Waters University, we propose to establish a research coordination network that enhances undergraduate biology education by capitalizing on the advantages of CUREs as a model system.

Exploring the Effects of Invasion on Plant Morphology: a BCEENET Course-based Undergraduate Research Experience | Room: 104B
Caroline DeVan, New Jersey Institute of Technology
Audience: Undergraduate Lower & Upper Division
This presentation will introduce the audience to a course-based undergraduate research experience that allows students to explore morphological impacts of invasion on plants using digitized natural history collections. Examples of implementation in both online and in-person classes will be shared.

Promoting the spread of positive student attitudes about plants and scientists via online mentoring | Room: 106, Grand Ballroom
Jennifer Hartley, Botanical Society of America
Catrina Adams, Botanical Society of America
Audience: Grades 9-12
As climate change and food shortages loom, increasing students' interest in plants and science professions is increasingly important. With this in mind, PlantingScience enables science professionals to mentor high school+ students as they explore plant-related concepts in the classroom.

Making ecology more inclusive: Student perspectives | Room: SGA 100
Felix "Javi" Berrios Ortega, University of Puerto Rico
Khanh Ton, University of New Hampshire
Tajiana Washington, University of Chicago
Audience: Undergraduate Lower & Upper Division
This presentation provides an overview of how RCN-UNIDE seeks to increase human diversity outreach in undergraduate ecological education by emphasizing the importance of elevating students' voices in developing meaningful interventions.
Saturday Short Presentations

9:15 AM - 9:45 AM

Focus Questions: Why This is my Best Year
Teaching Biology | Room: SGA 100
Thomas Oviatt, BVSD / Fairview High School
Audience: Grades 9-12, Undergraduate Lower Division
We will discuss using STeLLA modeled focus questions at the beginning of units/lessons as a way to improve student engagement, agency, and inclusion in biology.

Using big data in biology courses for non-science majors - the Mosquito Module | Room: 104B
Anja Kade, University of Alaska Fairbanks
Audience: Grades 9-12, Undergraduate Lower Division
In our online teaching module, undergraduate students examine Alaska mosquito diversity in space and time by exploring publicly available data through our ShinyApp, which integrates biological and climatological info from the National Ecological Observatory Network.

Engaging Students in Authentic Scientific Investigations Through Citizen Science | Room: 104C
Sarah Jones, Chicago Botanic Garden
Audience: Grades 9-12, Undergraduate Lower & Upper
Discover how to engage students in authentic research! Citizen science provides a unique, accessible way to launch student investigations while reinforcing ecological concepts. Come join Budburst, an education-focused citizen science project investigating climate change impacts on plants, pollinators, and ecosystems.

Population and Economic Growth: Effect Upon Deforestation - Data Inquiry in the High School Classroom | Room: 104B
James Lehner, The Taft School
Audience: Grades 9-12, Undergraduate Lower Division
Many websites can provide valid, current information that can be used to yield important relationships between various categories of study. Students will research deforestation, economic and population growth and the pandemic impact to yield patterns and gain skills.

DataVersify: Humanizing and diversifying scientist role models in data literacy instruction | Room: SGA 100
Melissa Kjelvik, Michigan State University
Audience: Grades 9-12, Undergraduate Lower & Upper
Strategies and resources demonstrating the use of scientist profiles in tandem with data literacy will be shared. Results from our efficacy study, which examined how the inclusion of diverse scientist role models in undergraduate instruction affected student attitudes.

10:00 AM - 10:30 AM

Getting back to ecology: Making connections to sustainability through the 4DEE framework | Room: 104C
Erica Tietjen, Nevada State College
Audience: Undergraduate Lower Division & Upper
In higher education, sustainability-focused campus initiatives have grown. The Four-Dimensional Ecology Education (4DEE) framework provides an opportunity to expose students to the value and relevance of ecological science to sustainability, particularly through the human-environment interaction dimension. I will share my experiences with undergraduate learners as they have worked toward making those connections.
Free Teaching Resources and Professional Development for Life Science Educators

Join us for these LDC 2023 events

Movie Night
Watch and discuss two classroom films:

• COVID-19 Sparks Community Action
• Mystery of the Buffalo Boom

Friday, March 24th at 7:00–8:00 PM
Efferson Student Union’s Grand Ballroom

Workshop

Modeling Epidemics: Using an HHMI BioInteractive Simulator to Study Real Outbreaks

Saturday, March 25th at 12:45–2:15 PM
Efferson Student Union’s Grand Ballroom

Visit biointeractive.org
### Thursday At-a-Glance

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<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Location</th>
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<tbody>
<tr>
<td>12:00 PM</td>
<td>Registration Opens, Grand Ballroom (Room 106), H. Manning Efferson Student Union</td>
<td>Grand Ballroom (Room 106)</td>
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<tr>
<td>1:00 PM</td>
<td>Fieldtrip - FAMU’s Viticulture Center for Small Fruit Research ($20)</td>
<td>Grand Ballroom (Room 106)</td>
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<td>2:00 PM</td>
<td>Fieldtrip - National High Magnetic Laboratory Tour</td>
<td>Grand Ballroom (Room 106)</td>
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<td>2:00 PM</td>
<td>Fieldtrip - FAMU School of the Environment’s Rattlermoji Buoy ($20)</td>
<td>Grand Ballroom (Room 106)</td>
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<td>7:00 PM</td>
<td>Informal Gathering at Proof Brewing Company</td>
<td>Grand Ballroom (Room 106)</td>
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### Friday At-a-Glance

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<tr>
<td>7:30 AM</td>
<td>Registration Opens, Grand Ballroom (Room 106), H. Manning Efferson Student Union, FAMU</td>
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<tr>
<td>8:00 AM</td>
<td>Welcome/Keynote: Dr. Victor Ibeanusi, Florida A&amp;M University, Grand Ballroom (Room 106)</td>
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<td>9:30 AM</td>
<td>Break</td>
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<td>Break</td>
<td>Grand Ballroom (Room 106)</td>
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<td>10:30 AM</td>
<td>Workshop&lt;br&gt;Sumter: Drones Flying High as New Tool for Field Biologists.</td>
<td>Room: SGA 100</td>
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<td>Workshop&lt;br&gt;Prevost &amp; Beck: Assess What’s Important: Creating Assessments Aligned to 4DEE</td>
<td>Room: 104B</td>
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<td>Workshop&lt;br&gt;Buntz: Scientific Method, Stats &amp; Ecology</td>
<td>Room: 104C</td>
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<td>12:00 PM</td>
<td>Lunch, Grand Ballroom (Room 106)</td>
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<td>1:00 PM</td>
<td>Education Share Fair Session 1, Grand Ballroom, Room 106</td>
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<td>2:15 PM</td>
<td>Break</td>
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<td>Short Presentation&lt;br&gt;Gragg: The Challenges and Opportunities of Teaching Pandemic Mismatch, Ignorance and Plurality</td>
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<td>Short Presentation&lt;br&gt;Phillips: Uncovering Hidden Figures of Natural History Collections Using Digital Data Sleuthing &amp; Storytelling</td>
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<td>3:00 PM</td>
<td>Break</td>
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8:00 AM  Keynote: Dr. Heather Lanthorn, Social Science Research Council, Grand Ballroom (Room 106)
9:00 AM  Break

9:15 AM  Oviatt: Focus Questions: Why This is my Best Year Teaching Biology
         Kade: Using Big Data in Biology Courses for Non-Science Majors – the Mosquito Module
         Jones: Engaging Students in Authentic Scientific Investigations Through Citizen Science

9:45 AM  Break

10:00 AM Kjelvik: DataVersify: Humanizing and Diversifying Scientist Role Models in Data Literacy Instruction
         Tietjen: Getting back to ecology: Making Connections to Sustainability Through the 4DEE Framework.

10:30 AM Break

10:45 AM Networking Session, Grand Ballroom (Room 106)

11:45 AM Lunch Keynote Panel: Dr Brenda Spencer, Florida A&M University and Dr. Tamara Basham, Collin County Community College Plano Campus, Grand Ballroom (106)

1:00 PM  Strode and Gibson: Modeling Epidemics: Using an HHMI BioInteractive Simulator to Study Real Outbreaks
         Muth: Microbiomes for All – Experimental Design and Data Analysis for Complex Environmental Microbiomes
         Kalluvila: A Faculty-Driven Collaborative Effort to Expand the Use of OER During the Pandemic in a Large Community/Technical College setting.
         Lanthorn: Fostering science information literacy in the classroom?

2:30 PM  Break

2:45 PM  Education Share Fair Session 2, Grand Ballroom (Room 106)

3:45 PM  Wrap Up

4:00 PM  Adjourn
Assess What's Important: Creating Assessments Aligned with the 4DEE Framework | Room: 104B
Luanna Prevost, University of South Florida
Christopher Beck, Emory University
Audience: Undergraduate Lower & Upper Division
Transform your assessments in majors, non-majors and interdisciplinary courses. Learn how to apply the 4DEE framework and use multidimensional learning tools to create or modify your assessment items. Please bring a sample learning objective and assessment from your course.

Scientific Method, Stats & Ecology | Room: 104C
Jennifer Buntz, Central New Mexico Community College
Audience: Grades 9-12, Undergraduate Lower Division
Three Quantitative Biology @ Community College teaching modules will be presented. Developed via collaboration between math and biology faculty, these modules focus on teaching statistics in ecological and/or health related contexts. Contextualizing these topics within Scientific Method will be covered.

Drones flying high as new tool for field biologists | Room: SGA 100
La’Quata Sumter, Focusing On Me, Inc
Audience: Grades 9-12, Undergraduate Lower Division
Drones are increasingly used in agriculture, rescue missions, and aerial photography. This ability has made drones a worldwide phenomenon, and they are now more popular than ever. Biologists and scientists in other fields can use drones to track and monitor wildlife. In this session, attendees can experience hands-on, real-world challenges and missions using drones.

Budget Science: How to implement inquiry-based organismal labs without breaking the bank | Room: 104B
Sarah Wofford-Mares, Florida State University
Lori Tolley-Jordan, Jacksonville State University
Audience: Undergraduate Lower & Upper Division
Low-cost, inquiry-based lab (IBL) activities can boost accessibility to necessary scientific skillsets, helping students secure jobs. This workshop will demonstrate the design and implementation of an organismal IBL with broad application that teaches students collaboration, computer skills, and data analysis/interpretation.

Turning ecological research into engaging online modules for undergraduates through Gala/OCELOTS | Room: SGA 100
Ann Russell, Iowa State University
Suzanne Macey, American Museum of Natural History
Charles Willis, University of Minnesota
Chris Beck, Emory University
Audience: Undergraduate Lower & Upper Division
Learn about creating and adopting online, undergraduate-level modules in tropical ecology. In this NSF-funded network, researchers work with specialists in 4DEE, pedagogy, interactive data tools, and media to create research-based modules, hosted on Gala, a user-friendly, open-source and open-access platform.

Bringing the rocky shore into the classroom - a CURE to explore scientific discovery | Room: 104C
Alison Haupt, CSU Monterey Bay
DIMES (https://tinyurl.com/a52nuwub) marine ecology teaching modules focus on the scientific process and computational literacy. This workshop will demonstrate the intertidal module and how it can be adapted across education-levels and used in virtual, field, or classroom settings.
Saturday Workshops

1:00 PM - 2:30 PM

A Faculty Driven Collaborative Effort to Expand the Use of OER During Pandemic in a Large Community College | Room: 104B

*Thomas Kalluvila, Milwaukee Area Technical College*
*Carl Morency, Milwaukee Area Technical College*

Audience: Undergraduate Lower & Upper Division, Open Educational Resources have proved to bring equity in classrooms, especially during pandemic. Our college has established an open-access team to bring all stakeholders together. The collaborative efforts led by a faculty-driven approach expanded the use of OER in all educational areas including biological sciences.

**Modeling Epidemics: Using an HHMI BioInteractive Simulator to Study Real Outbreaks | Room: Grand Ballroom**

*Paul Strode, Fairview High School*
*Phil Gibson, University of Oklahoma*

Audience: Grades 9-12, Undergraduate Lower Division

Participants will use new HHMI BioInteractive resources to predict and simulate the spread of an infectious disease in a population using the Susceptible - Infectious - Removed (SIR) model. Participants will collect data, generate graphs, and use data from authentic outbreaks.

**Microbiomes for All - Experimental Design and Data Analysis for Complex Environmental Microbiomes | Room: SGA 100**

*Theodore Muth, City University of New York*

Audience: Grades 9-12, Undergraduate Lower & Upper

Advances in DNA sequencing and analysis technologies have made microbiome research projects accessible to undergraduate students and high school students. Microbiome projects allow students to explore the diversity and complexity of their local environmental microbiomes. Microbiome projects are flexible and able to address core learning goals in a range of courses, including introductory biology, ecology, genetics, environmental studies and others.

**Fostering science information literacy in the classroom | Room: 104C**

*Heather Lanthorn, Mercury Project*

Audience: Grades 9-12, Undergraduate Lower & Upper

In this session, we will define mis-, dis-, and malinformation and information literacy—and then define (science) information literacy goals for our students. Together, we will draw on literature and experience to build small ‘tricks’ and a ‘skills lab’ lesson plan to build information literacy and self-efficacy over a semester.
Table #1
Active learning: How to get students involved better?
Behzad Ghanbarian, Kansas State University
Audience: Grades 9-12, Undergraduate Lower Division
Active learning is a key component in teaching. Although some students are naturally involved in class discussions, some need motivations beyond extra-credit points. In this proposal, we present ways to encourage students to get involved, speak up, and share ideas.

Table #2
Phenology Network and Citizen Science in a General Botany Course
Leah Dudley, East Central University
Audience: Undergraduate Lower Division
National Phenology Network's app Nature's Notebook and resources will be introduced, including use in General Botany, a lower level undergraduate course. The project description with supporting documents will be presented as well as formative and summative assessment tools (Visualization Tool).

Table #3
Biomes Worldbuilding Learning Activity
LeRoy Humphries, Southeastern Community College
Audience: Grades 9-12, Undergraduate Lower Division
Planet Earth has a wide range of ecological zones, called biomes, based on precipitation and temperature. This activity promotes an understanding of how biomes are defined, and how this affects the organisms living there.

Table #4
Using COVID-19 Real World Scenario to understand Fake Information.
Cora Varas-Nelson, Pima Community College
Audience: Undergraduate: Lower Division
Undergraduate students in the first two years of college should be able to understand science and how to determine fake information. This module is to investigate a Covid-19 real-world scenario in which we will do a structured review and analysis of information.

Table #5
A Place for Storylistening in the 4th Dimension of 4DEE: Augmenting Scientific Data
Anne Cross, Tulsa Community College
Audience: Grades 9-12, Undergraduate Lower and Upper Division
Participants will explore storylistening as an active learning technique for undergraduate STEM classes. Storylistening generates narrative evidence to inform ecological reasoning and to enhance the human dimension of the 4DEE framework. Finally, storylistening could advance antiracism and DEI throughout STEM.

Table #6
Lank Back and Renewable Energy
Tamara Basham, Collin County Community College
Audience: Grades 9-12, Undergraduate Lower Division
To mitigate climate change, we must transition to renewable energy sources. Accessing and storing renewable energy requires mined materials. This activity uses a proposed mine in Arizona as a case study of the environmental ethical issues of renewable energy use.

Table #7
Lab Assessment of Biological Courses that use OER
Thomas Kalluvila, Milwaukee Area Technical College
Audience: Undergraduate: Lower Division
I use Open Educational Resources (OER) for my Anatomy & Physiology course. I am currently developing lab assessment tools for my student population of this course. This session would help me to share my progress and get feedback from other faculty.

Friday 1:00 PM - Session 1

Round 1

Table #1
Active learning: How to get students involved better?
Behzad Ghanbarian, Kansas State University
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Active learning is a key component in teaching. Although some students are naturally involved in class discussions, some need motivations beyond extra-credit points. In this proposal, we present ways to encourage students to get involved, speak up, and share ideas.

Round 2

Table #5
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Participants will explore storylistening as an active learning technique for undergraduate STEM classes. Storylistening generates narrative evidence to inform ecological reasoning and to enhance the human dimension of the 4DEE framework. Finally, storylistening could advance antiracism and DEI throughout STEM.
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Course-based Undergraduate Research Experience for Students Under-represented in Biology (CURESUB)
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Table #3
Goldenrod Ball Gall Ecology Lab: Investigating a tri-level trophic system to test the predictions of natural selection
*Christine Barlow, Ivy Tech Community College*
Audience: Undergraduate Lower Division
In this lab, students investigate ecological interactions between a plant, a gall maker, and species that exploit the gall maker. Students are challenged to think deeply about ecological theories and to generate hypotheses that are tested in the field.

Table #4
DataVersify: Integrating scientist profiles with data literacy
*Melissa Kjelvik, Michigan State University*
Audience: Grades 9-12, Undergraduate Lower & Upper Division
DataVersify materials aim to highlight scientist role models and their stories alongside data literacy instruction. While we have tested beta versions of our materials, we are currently seeking feedback as we scale up our design and select appropriate learning platforms.

Table #5
Making "sense" out of surface area to volume relationships
*Jenise Snyder, Ursuline College*
Audience: Grades 9-12, Undergraduate: Lower Division
Using a multimodal approach, students will explore surface area to volume relationships. Using quantitative skills and their senses of taste and/or sight with different size coated candies, students will determine how smaller cells and larger cells differ in these relationships.

Table #6
Using an Internal Course Narrative to Improve Student Outcomes in Introductory Organismal Biology
*Thomas McCabe, The University of Texas at El Paso*
Audience: Undergraduate: Lower Division
This resource is an alternative organization of topics for introductory organismal biology that focuses on a progression through levels of biological scale to support student conceptual understanding of concepts in ecology and evolution.

Table #7
Training Materials for the NEON Plant Diversity Sampling Protocol
*Rhea Esposito, National Ecological Observatory Network*
Audience: Undergraduate Lower & Upper Division
The National Ecological Observatory Network (NEON) is considering providing training materials publicly. Here, we present our training on the Plant Diversity protocol as an example curriculum, and gather feedback about using our materials in an educational setting more broadly.

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**Saturday 2:45 PM - Session 2**

**Round 1**

Table #1
Hybrid teaching in Biology post Covid-19
*George Belcourt, Stone Child College*
Audience: Undergraduate Lower Division
The hybrid approach to classroom learning is that lessons and assignments are tailored more around the students learning from an online platform rather than the traditional classroom. Microsoft Teams is utilized frequently, and for some students this method worked extremely well and for others not so well.

Table #2
A proposed introduction to ethology exercise at the Aquarium of Niagara
*Simon Bird, Aquarium of Niagara*
Audience: Grades 9-12, Undergraduate Lower Division
This proposed high-school and introductory undergraduate level exercise aims to provide students an introduction to ethology and an understanding of animal behavior through observation, data recording and analysis of aquatic animals while adhering to the 5E principles of learning.
Table #3
Redlining and Environmental Justice
Janel Ortiz, California State Polytechnic University
Audience: Undergraduate Upper Division
We explore inequity in environmental health and nature by utilizing a redlining map. Student groups analyze a city to see who has access to greenspaces by looking at patterns of tree cover, minoritized populations, house values, and impervious surface.

Table #4
When do lilacs bloom? Exploring real-world data in the classroom
Sarah Jones, Chicago Botanic Garden
Audience: Grades 9-12, Undergraduate Lower Division
This activity aims to build data literacy skills through student exploration and interpretation of an authentic dataset from Budburst (budburst.org), a nationwide citizen science program studying the connection between climate change and the timing of seasonal life stages in plants.

Table #5
Creating a One-page Role-Playing Game for Understanding Organismal and Ecological Concepts
Darcy Ernst, Evergreen Valley College
Audience: Grades 9-12, Undergraduate Lower & Upper
This resource guides students in creating a one-page role-playing-game (RPG) based on an organism and its role in an ecological community. Students research the life history and interactions of an organism to create their RPG. Includes instructor resources for facilitation.

Table #6
Redesigning Environmental Microbiology Lab to Include Authentic Inquiry Based Learning.
Philips Akinwole, DePauw University
Audience: Undergraduate Lower & Upper Division
Replacing "cookbook" laboratory activities with inquiry-based labs allowed students to be engaged through applying scientific processes to design experiments, utilize quantitative reasoning, and effectively communicate results. Such an approach can be achieved using Biolog-Ecoplate to quantify metabolic-profiling of bacterial diversity.

We want your feedback!
Please complete the conference evaluation coming to your email inbox.
https://www.esa.org/ldc/evaluation/

Round 2

Table #1
Enhance the use of OER in STEMM education for Equity & Diversity
Carl Morency, Milwaukee Area Technical College
Audience: Undergraduate Lower Division
The Covid-19 pandemic resulted in long-lasting financial burden on our students. OER has a significant role in alleviating the challenges brought by the pandemic in higher education. The advantages of OER over the traditional textbook are they are ready for distance learning, adaptable to the need of individual courses and can be tailored towards the need of a specific student population, access to learning materials indefinitely that help lifelong learning, and above all reduce equity gap among the disadvantaged student population.

Table #2
Data science module using EJ screen
Alison Haupt, CSU Monterey Bay
Audience: Undergraduate Lower & Upper Division
We are working to develop a data science module that uses storytelling to play data science skills in context using EPA Environmental Justice Screen tool.

Table #3
Understanding the evolutionary relationships of cool, parasitic flatworms.
Lori Tolley-Jordan, Jacksonville State University
Audience: Undergraduate Lower, Upper, & Graduate
Scaling up and down the fractal curves of evolution using the interactive, online tool onezoom.org: applications from non-major's Introductory Biology to upper division/graduate Evolutionary biology courses.

Table #4
Promoting Research Among Undergraduate Students in Engineering and Computer Science
Sudarshan Kurwadkar, California State University
Audience: Undergraduate Lower & Upper Division
Experiential learning through field demonstration of water quality

Table #5
Using Soil Fungi Next Generation Sequencing Data to Study Wildfire Resiliency
Savanah Senn, Los Angeles Pierce College
Audience: Undergraduate Lower & Upper Division
This lab exercise is an active learning introduction to techniques used to analyze soil microbiome data. Students will also learn about forming hypotheses, what kind of questions can be answered with this data, and practice the scientific method.
Table #6
Laboratory activity to explore the functional diversity of fungi
*Claudia Stein, Auburn University at Montgomery*
Audience: Undergraduate Lower & Upper Division
Lab activity in which students are split in different groups and perform experiments that investigate different functions fungi fulfill: A) Decomposition, B) Plant symbionts, C) Disease agents. Students will present their results in a mini-symposium to the whole class.

Table #7
Integrating Innovative Research Projects into Teaching Biostatistics
*Qingxia Li, Fisk university*
Audience: Undergraduate: Upper Division
This project is intended to: 1) foster students' interest in pursuing STEM disciplines using the real-world applications of the course-embedded research; and 2) increase deeper student learning due to this piqued interest and application of skills in the context of the course.

### Networking Sessions

*Variants in Biology Education: What Can We Learn From Pandemics Saturday March 25, 10:45AM*

This year’s Networking Session will focus on three thematic conference tracks and two additional topics related to current challenges in teaching and learning:

#### N1) Adapting to and Teaching Disease Ecology

1. What disease ecology examples have been most successful for you in the classroom?
2. Are there any classroom tools, such as computer software, that have helped your students learn about disease ecology?
3. Should disease ecology (and related fields, epidemiology, virology, etc.) be required for biology students these days? Discuss why or why not, and/or discuss suggestions given how the world responded to COVID-19.

#### N2) Fake News, Real Science, or somewhere in between (Science Misinformation)

1. How can we help students address and navigate the many different types of media they encounter?
2. How do you incorporate media into your ecology or environmental science classroom?
3. Scientific literacy is critical for identifying misinformation. What recommendations do you have to foster scientific literacy in your classroom?

#### N3) Research innovations and careers

1. What are your strategies for encouraging students to think broadly about career options?
2. What career options outside of academia are available for people with degrees in ecology or related fields, and how do you introduce those career options to students?

#### N4) Climate change education

1. Climate change may facilitate new disease outbreaks or the range expansion of existing diseases. What are some successful ways you have connected disease ecology and climate change in the classroom?
2. How do we support “climate change” education that focuses less on the temperature and more on the ecosystem’s consequences? Is this a more effective path forward?

#### N5) Biodiversity Data and Literacy in the classroom

1. How do you prepare students to evaluate and use large, openly available sources of ecologically relevant data?
2. What are the challenges you face in implementing biodiversity data literacy instruction and how did/can you overcome them?
3. How can we use biodiversity data as a resource to introduce students in ways of evaluating data, bias, and sources?
4. What recommendations do you have for preparing students for ecological data literacy needed for the 21st-century job market?