Friday

SESSSION KEY:

ELEM - Elementary
MS - Middle, Junior High
HS - High School
2Y - 2-year College
4Y - 4-year College & University

7:30AM–8:30AM

NABT First Timers' Coffee Break

Grand Ballroom E • Special Event (60 min) • GA

First-time conference attendees are invited to learn more about NABT, the 2024 Professional Development Conference, and connect with other "first timers." NABT leaders and former "first timers" will also be available to answer your questions and help you make the most of your time in Anaheim.

8:00AM–9:00AM

NABT BIPOC Practitioners' Affinity Meeting

Gold Key I & II • JEDI / Inclusive Teaching Practices • Special Event (60 min) • GA

Network with fellow BIPOC practitioners to connect and build relationships! This event is open to any practitioner of any level who self-identifies as a Black, Indigenous, and/or person of color.

8:00AM–9:00AM CONT.

SPECIAL PROGRAMMING PRESENTED BY BIO-RAD

1675-109132 Determination of Biological Sex with the Bradford Assay: A Forensic Approach

Grand Ballroom C & D • Biotechnology • Hands-on Workshop (75 min) • HS, 2Y, 4Y

Discover forensic biotech in our workshop. Perform Bradford Assay for gender ID from fingerprints and delve into biochemical analysis with practical skills.

Damon Tighe, Bio-Rad Laboratories, Hercules, CA

SPECIAL PROGRAMMING PRESENTED BY MINIPCR

1675-109548 Accessible Protein Expression and Purification for Classroom Settings

Platinum Ballroom 1 • Biotechnology • Hands-on Workshop (60 min) • HS, 2Y, 4Y

Hands-on protein expression and purification in a classroom-friendly format! Express a mixture of fluorescent proteins using cell-free protein technology, then separate them using affinity purification. Magnetic purification means no columns!

Ally Huang, miniPCR bio, Cambridge, MA

9:15AM–10:15AM

PLENARY SPEAKER

Alex Troutman

See biography on page 17

A Journey Through the Nature Doorway and How Representation Matters for You, Them, and Me

Platinum Ballroom 5 & 6 • Special Speaker (60 min) • GA

Nature serves as a gateway, sparking curiosity and igniting passions for science, biology, and careers in the natural resources and STEAM fields. As we guide others through this 'doorway,' it's essential to provide representation that reflects diverse backgrounds, showcasing individuals who not only look like them, but also share similar life experiences.

By providing and embodying this representation, we can demonstrate to the individuals we hope to reach, and others, that BIPOC individuals can achieve success, often against the "odds." This intentionality ensures an inclusive and inspiring journey into the wonders of the natural world.

10:30AM–12:30PM

NABT EVOLUTION SYMPOSIUM PRESENTED BY NCSE

Mammal Madness

Platinum Ballroom 3 & 4 • Evolution • Special Session (120 min) • GA

A Lioness Walks into an Orca: How Stories Enhance Science Education

Human minds are adapted for story-telling and story-listening, especially about animals and nature. Research from STEM education, evolutionary social science, cultural anthropology, and social psychology demonstrate that stories and illustrations improve learning. These elements have been embedded in education for tens of thousands of years and, in part, underlie March Mammal Madness (MMM).

MMM is a simulated tournament of empirically informed, yet hypothetical, encounters between animal "combatants." Tournament outcomes are revealed by weaving published scholarly science into story arcs, following combatant characters across a series of encounters through numerous ecosystems. Each March, facts and findings are transformed into dramatic reveals and unexpected plot twists as teachers and students learn the fate of their chosen victor. Reaching hundreds of thousands of players worldwide annually, March Mammal Madness demonstrates that dispersing science is most sustainable when good-natured competition is combined with ancestral adaptations for community and storytelling.

Katie Hinde, Arizona State University, Tempe, AZ

Mystery Mammal Madness: Curious Cases of Convergence

This session will provide classroom strategies that challenge students' preconceived notions about evolutionary fitness. Often, students believe fitness is about being bigger, faster, or stronger and that evolution is progressing towards an ultimate outcome. However, by using convergent evolution as an example, students understand that fitness is more about how well an organism is suited to its environment and that there is no predetermined goal. In this storyline introduction, teachers will receive materials to help students evaluate how two completely different groups of organisms can develop the same adaptations.

Blake Touchet, Wendy Johnson, and Jeff Grant, National Center for Science Education, Oakland, CA

10:30AM–11:45AM

1675-106278 Providing STEM Enrichment and Connections for the Underserved Population through Collaboration with Local Schools, Businesses, and Organizations

Gold Key I & II • JEDI / Inclusive Teaching Practices • Demonstration (75 min) • HS, 2Y, GA

The Nighthawk Collaborative STEM Connection (NCSC) includes an advisory board of community/business/educational partners that collaborate on existing STEM outreach efforts and are beginning to provide STEM research opportunities for underserved students.

Reggie Cobb, Nash Community College, Rocky Mount, NC

1675-105519 The LifeSkills Guide: A Tool for Faculty Teaching Undergraduate Life Science Courses

Grand Ballroom A & B • Instructional Strategies • Demonstration (75 min) • 2Y, 4Y

The IGELS project (Interactions in General Education Life Science courses) will solicit feedback on a new tool for identifying appropriate student outcomes, activities, and assessments for the general, non-majors life science course.

Gordon Uno, University of Oklahoma, Norman, OK; Sam Donovan, BioQUEST, Pittsburgh, PA; Melanie Lenahan, Raritan Valley Community College, Clinton, NJ; Karla Fuller, Gutmann Community College, New York, NY; Tamar Goulet, University of Mississippi, University MS; Gabriela Hammerlinck, University of Florida, Gainesville, FL; Elizabeth Harrison, Kennesaw State University, Kennesaw, GA; Heather Rissler, North Iowa Area Community College, Mason City, IA; Davida Smyth, Texas A&M University-San Antonio, San Antonio, TX; Bryan Dewsbury, Florida International University, Miami, FL

SPECIAL PROGRAMMING PRESENTED BY BIO-RAD

1675-109220 Do Real Hands-on CRISPR Gene Editing!

Grand Ballroom C & D • Biotechnology • Hands-on Workshop (75 min) • HS, 2Y, 4Y

Experience CRISPR-Cas9 gene editing experiments designed for your students' learning! In this hands-on workshop, edit a chromosomal gene with essential experimental controls using the same cut-and-repair technology used in medicinal and agricultural applications.

Damon Tighe, Bio-Rad Laboratories, Hercules, CA

SPECIAL PROGRAMMING PRESENTED BY HHMI

1675-108408 Beyond the Headlines: Constructing Models to Understand the Effects of Climate Change on Biodiversity

Grand Ballroom F • Ecology / Environmental Science / Sustainability • Hands-on Workshop (75 min) • HS, 2Y, 4Y

Participants will explore phenomena to develop explanations of how the carbon cycle affects biodiversity at the ecosystem level. We'll explore BioInteractive resources that introduce students to diverse scientists, global impacts, and solutions to climate change.

Diana Siliezar-Shields, Barrington High School, Barrington, RI and Tanea Hibler, Rabun Gap-Nacoochee School, Rabun Gap, GA

SPECIAL PROGRAMMING PRESENTED BY CAROLINA

1675-107861 The Case of the Murdered Mayor–Solve a Forensic Case Using Multiple Lines of Evidence

Orange County Ballroom 1 • Biotechnology • Hands-on Workshop (75 min) • ML, HS, 2Y

Assume the role of a crime scene investigator solving a crime scenario. Students use fingerprinting, hair analysis, tire impressions, blood typing, forensic entomology, and a police log to identify a suspect from six alleged perpetrators.

Ryan Hainey, Carolina Biological Supply Company, Burlington, NC

SPECIAL PROGRAMMING PRESENTED BY BIOZONE

1675-108512 BIOZONE Showcase–New Biology Titles for AP®, IB, NGSS, APES, and Anatomy & Physiology

Orange County Ballroom 2 • General Biology • Demonstration (75 min) • HS

Explore the innovative methodologies used to deliver engaging programs for AP® Biology, APES, NGSS, IB Biology, Anatomy & Physiology, and Environmental Science. Attendees receive a free print copy, plus 90-day access to BIOZONE World.

Richard Allan, BIOZONE Corporation, Parker, CO

10:30AM–11:45AM CONT.

1675-106491 Health Hacking: Students Exploring Health Outcomes with Big Data

Orange County Ballroom 3 · Biotechnology · Demonstration (75 min) · ML, HS

Engage students in authentic health research using the "All of Us" research dataset. We will present curriculum we used to engage students in this robust dataset to investigate their own research questions about biomedicine.

Matthew Blank, Katherine Harris, and Jimmie Thomas, Baylor College of Medicine, Houston, TX

1675-106184 Dragons, CER, iNaturalist and More–Using the ABT for Classroom Lessons

Orange County Ballroom 4 · Instructional Strategies · Hands-on Workshop (75 min) · ML, HS

Learn how dragon traits and molecular data teach biology students how to use a cladogram model to interpret and test predictions. Learn how to use CER to improve student writing and literacy.

Mark Little (retired), Broomfield High School, Arvada, CO

SPECIAL PROGRAMMING PRESENTED BY MINIPCR

1675-109550 Hands-on Activities to Bring CRISPR/Cas to Your Class

Platinum Ballroom 1 · General Biology · Hands-on Workshop (75 min) · HS, 2Y, 4Y

See our suite of CRISPR/Cas activities. We have something for everyone with both in vitro and in vivo CRISPR/Cas labs and free resources such as paper modeling activities.

Ally Huang, miniPCR bio, Cambridge, MA

1675-106238 Too New for Textbooks: Stories of DNA Discovery from the Past Year

Platinum Ballroom 2 · Genetics · Demonstration (75 min) · ML, HS, 2Y

Want to learn about brand-new genetic discoveries? Hear about the impact of these discoveries and how they connect to curricula to bring cutting-edge science to life. Plus, get the new HudsonAlpha Guidebook!

Kelly East and Jennifer Hutchison, HudsonAlpha Institute for Biotechnology, Huntsville, AL

1675-105442 Using AI as a Tool for Differentiation

Platinum Ballroom 7 · Curriculum Development · Hands-on Workshop (75 min) · HS

Come learn how various free AI platforms can be used to help students grow in the classroom. This session will allow you time to explore and learn how this could help your practice!

Jessica Pritzker, Glenbrook South High School, Glenview, IL

1675-106357 Aligned and Updated Project-Based Learning for AP® Environmental Science

Platinum Ballroom 8 · AP® Environmental Science · Demonstration (75 min) · HS, 2Y, 4Y

Learn about the benefits of a Project-Based Learning approach and how it can increase engagement for diverse learners using the newly updated AP® Environmental Science curriculum from consultants on behalf of the College Board.

Lisa Pavic, Glenbrook South High School, Glenview, IL; Erika Erickson, Gilmer County Schools, Gilmer, GA

SPECIAL PROGRAMMING PRESENTED BY 10K SCIENCE

1675-110784 Exploring Authentic Data in VR, from a CRISPR Treatment for Sickle Cell to an Invasive Species Wreaking Havoc on Agriculture

Platinum Ballroom 10 · Science Practices · Demonstration (75 min) · HS, 4Y

Bring authentic science data into your classroom: explore the CRISPR mechanic and how it can be used to treat sickle cell disease, or explore bacterial genetics through an agricultural-environmental scenario.

Laura Lynn Gonzalez and Elizabeth Cook, 10k Science, Oakland, CA, and Tanya Buxton, Menlo School, Atherton, CA

12:00PM–12:30PM

1675-106439 Cultivating Cultural Connections: Family Problem-Based Learning and Plants with Cultural Significance for Latiné Families

Gold Key I & II · Botany & Plant Biology · Demonstration (30 min) · ELEM, ML

This presentation briefly describes the "Our Plot of Sunshine" curriculum, developed and used with 5th and 6th grade Latina girls and their parents, emphasizing edible plants with significance for Latiné cultures (e.g. purslane, marigolds).

Margarita Jimenez-Silva and Caitlyn Ishaq, University of California, Davis, Davis, CA; Peter Rillero, Arizona State University, Phoenix, AZ; Kim Rillero, Urban Farming Education, Phoenix, AZ

12:00PM–12:30PM CONT.

1675-106551 Engaging Introductory Undergraduate Biology Students' Engagement in Metacognition Using the BioMet Learning Modules

Grand Ballroom A & B • Instructional Strategies • Paper (30 min) • 2Y, 4Y, GA

This session will focus on findings from a study that explored how metacognition developed among undergraduate biology students and how the use of Biology Metacognition Learning Modules supported students in developing and engaging in metacognition.

Jaime L. Sabel, University of Memphis, Memphis, TN

SPECIAL PROGRAMMING PRESENTED BY BIO-RAD

1675-109222 Pollen Fingerprinting: Uncovering Nature's Role in Forensics

Grand Ballroom C & D • General Biology • Demonstration (30 min) • HS, 2Y, 4Y

Discover the intriguing world of forensic botany and learn to teach the science of pollen analysis in this interactive workshop using the ZOE Fluorescent Cell Imager.

Damon Tighe, Bio-Rad Laboratories, Hercules, CA

SPECIAL PROGRAMMING PRESENTED BY HHMI

1675-108514 Going Local: Using HHMI BioInteractive Resources to Teach Biodiversity Survey Methods and Solutions

Grand Ballroom F • Ecology / Environmental Science / Sustainability • Hands-on Workshop (30 min) • HS, 2Y, 4Y

Discover ways to engage your students in biodiversity studies in local ecosystems with HHMI BioInteractive resources. Join us as we discuss surveying biodiversity in a variety of ecosystems to formulate solutions to ecological threats.

Jeannie Long, Tennessee Wesleyan University, Athens, TN

SPECIAL PROGRAMMING PRESENTED BY CAROLINA

1675-107859 Teaching Photosynthesis and Cellular Respiration with Algae Beads

Orange County Ballroom 1 • General Biology • Hands-on Workshop (30 min) • ML, HS, 2Y

Participants will make and use sodium alginate and Chlorella to make algae beads. They will learn how the beads can be used to teach photosynthesis and cellular respiration.

Crystal Risko, Carolina Biological Supply Company, Burlington, NC

SPECIAL PROGRAMMING PRESENTED BY VERNIER

1675-111223 Introduction to Spectroscopy

Orange County Ballroom 2 • General Biology • Hands-on Workshop (30 min) • HS, 2Y, 4Y

Come see how easy it is to analyze plant pigment spectra, chlorophyll content in olive oil and to even investigate algae pigments. Learn how to create standard curves and analyze enzymatic activity. Spectroscopy is easy and exciting for your students using the Go Direct SpectroVis Plus Spectrophotometer and our free Spectral Analysis app, available for computers, Chromebooks and mobile devices.

John Melville, Vernier Science Education, Beaverton, OR

1675-105904 Student Perceptions of Transfer of Knowledge for Quantitative Reasoning in Undergraduate Biology Labs

Orange County Ballroom 3 • Instructional Strategies • Paper (30 min) • 2Y, 4Y, GA

Undergraduate biology students were asked to share their perspectives on how they transfer quantitative knowledge into their lab experiences. Student responses were analyzed for themes, including barriers and supports in the three domains of transfer.

Joelle Prate and Jeremy Hsu, Chapman University, Orange, CA

1675-106504 JEDI Session Writing Workshop

Orange County Ballroom 4 • Instructional Strategies • Hands-on Workshop (30 min) • ML, HS, GA

Are you interested in presenting at an NABT Conference? Join members of the JEDI Committee to workshop your NABT session proposal ideas and prepare to submit for the 2025 Conference in St. Louis.

Maribel Gendreau, Hampton Roads Academy, Yorktown, VA and Enya Granados, Clarke Central High School, Athens, GA

NABT BioClub

CHAPTERS

Abington Heights High School, Clarks Summit, PA
Aiken County Career and Technology Center, Warrenville, SC
Arcadia High School, Phoenix, AZ
Archbishop Curley High School, Baltimore, MD
Arroyo High School, San Lorenzo, CA
Athens High School, Troy, MI
Athens High School, Athens, IL
The Barstow School, Kansas City, MO
Bethlehem High School, Bardstown, KY
Bishop Garcia Diego High School, Santa Barbara, CA
Bloomington High School South, Bloomington, IN
Brentwood Academy, Brentwood, TN
Cabarrus Kannapolis Early College High School, Concord, NC
Canadian Valley Technical Center, OK
Caney Valley High School, Ramona, OK
Cardinal Gibbons High School, Raleigh, NC
Carrboro High School, Carrboro, NC
Castle Park High School, Chula Vista, CA
Central Carolina Technical College, Sumter, SC
Central Falls High School, Central Falls, RI
Central Magnet School, Murfreesboro, TN
Chelan High School, Chelan, WA
Chester High School, Chester, PA
Clayton High School, Clayton, MO
Colonia High School, Colonia, NJ
Coronado High School, Colorado Springs, CO
Cuyohoga Community College, Macedonia, OH
Darnell-Cookman School of the Medical Arts, Jacksonville, FL
DeVry Advantage Academy, Chicago, IL
Divine Savior Holy Angels High School, Milwaukee, WI
Dora R-III School, Dora, MO
Dougherty Valley High School, San Ramon, CA
El Centro College, Dallas, TX
Emergence Academy, Springfield, MA
Emmett High School, Emmett, ID
Fairhaven High School, Fairhaven, MA
Florence Freshman Center, Florence, AL
Florida SouthWestern State College, Naples, FL
Freedom High School, Freedom, WI
Frontier Regional School, S Deerfield, MA
Georgia State University Perimeter College, Decatur, GA
Gillette College, Gillette, WY
Grafton High School, Grafton, WI
Grandville High School, Grandville, MI
Greater Lowell Technical High School, Tyngsborough, MA
Greater New Bedford Regional Vocational Technical High School, New Bedford, MA
Greensburg Salem High School, Greensburg, PA
Hampton Roads Academy, Newport News, VA
Harmony School in Innovation, Katy, TX
Hillsboro High School, Hillsboro, OR
Hilltop High School, Chula Vista, CA
Holt High School, Holt, MI
The Independent School, Wichita, KS
Julia R Masterman School, Philadelphia, PA
Kenmore West High School, Buffalo, NY
Kent County High School, Worton, MD
Kettle Run High School, Nokesville, VA
Lake Metroparks, Concord, OH
Lexington High School, Mansfield, OH
Louisiana School for Math, Science and the Arts, Natchitoches, LA
Martin Luther College, New Ulm, MN
Mary Persons High School, Forsyth, GA
Marysville High School, Marysville, KS
McDowell Intermediate High School, Erie, PA
Metropolitan Community College, Omaha, NE
Midland Park High School, Midland Park, NJ
Mid Michigan College, Harrison, MI
Minnetonka High School, Minnetonka, MN
Morganton, NC West Mifflin Area High School, West Mifflin, PA
Moscow High School, Moscow, ID
Mount Abraham Union High School, Bristol, VT
Nassau Community College, Garden City, NY
Northampton Area High School, Northampton, PA
Northwest Mississippi Community College, Oxford, MS
Olivet Nazarene University, Bourbonnais, IL
Palm Tree School, Fairfax, VA
Perkins High School, Sandusky, OH
Pike High School Freshman Center, Indianapolis, IN
Pikeview High School, Princeton, WV
Pinecrest High School, Southern Pines, NC
Putnam City High School, Oklahoma City, OK
Riverside City College, Riverside, CA
Riverside High School, Leesburg, VA
Saint Ignatius High School, Cleveland, OH
Seabury Hall, Makawao, HI
Seneca East High School, Attica, OH
Sherando High School, Winchester, VA
Sibley East Middle and High School, Arlington, MN
Skyline High School, Sammamish, WA
Snow College, Ephraim, UT
Southeast Community College, Lincoln, NE
South Central Jr Sr High School, Elizabeth, IN
South Garner High School, Garner, NC
Southern Wells High School, Poneto, IN
St. Andrew's Episcopal School, Potomac, MD
St. Clair High School, St. Clair, MI
State Library of PA, Lykens, PA
Stillwater High School, Stillwater, OK
Stouffville District Secondary School, Whitchurch-Stouffville, ON, Canada
The Summit County Day School, Cincinnati, OH
Sunlake High School, Land O'Lakes, FL
Taylor University, Upland, IN
Tiffin Columbian High School, Tiffin, OH
Troy High School, Troy, MI
Unionville High School, Kennett Square, PA
University Christian High School, Hickory, NC
Ursuline Academy, Dedham, MA
Vincennes University, Vincennes, IN
Visitation Academy - Saint Louis, St. Louis, MO
Walters State Community College, Rutledge, TN
Westdale Secondary School, Hamilton, Ontario
Western Piedmont Community College, Morganton, NC
West Mifflin Area High School, West Mifflin, PA
Wheeling Park High School, Wheeling, WV
Worthington Christian High School, Worthington, OH

The mission of the NABT BioClub is to recruit, support, nurture, and promote students who have an interest in biological sciences for personal reasons, academic preparation, the betterment of society, and possible career opportunities by providing guidance, resources, and activities to meet these goals.

Look for the BioClub logo to indicate recommended articles for NABT BioClub members. If you are interested in forming a chapter of the NABT BioClub, contact NABT at office@nabt.org.

15th Annual Biology Education Research Symposium

2:00PM – 4:00PM
Platinum Ballroom 8

The symposium is coordinated by the NABT Four-Year College & University Section's Research Committee.

Proceedings will be posted online at NABT.org

Bridging the Gap: Sex and Reproduction Education in the College Biology Classroom

Katherine Bates and Kimberly Dickman, United States Air Force Academy, Colorado Springs, CO

In the United States, sexual assault rates and sexually transmitted infections remain higher in college students compared to other sectors of the population. The 2021 Youth Behavioral Risk Survey by the Center for Disease Control and Prevention found at least eight percent of high school students have experienced forced sex they did not want, with prevalence greatly increasing as people enter college.

Comprehensive sex education can reduce rates of sexual activity and STIs. Many comprehensive sex education courses also focus on healthy relationships, consent, and recognizing sexual assault and can serve as a primary prevention tool for sex and dating. While sex education is often limited in public high school, colleges and universities present a unique opportunity to reach a wide audience with disparate sex education backgrounds. Sex educators can serve society better by teaching comprehensive sex education to increase protective factors for young adults.

Here, we present an analysis of the literature concerning the topics and mechanisms young adults want in comprehensive sex education. Additionally, we will discuss a college-level biology course we designed to follow best practices in comprehensive sex education and its effectiveness and reception among college students.

Exploring Outcomes from Participating in an Outdoor Science Activity

Carolyn Jess and Kristy Daniel, Texas State University, San Marcos, TX

Today's youth often lack opportunities to participate in science practices outdoors. The purpose of this study was to capture fifth-grade student responses to an outdoor science activity booklet about pollination to discover what outcomes the students received from the activity. The booklet contained four post-activity questions to find what each student found most enjoyable, important, helpful, and what aspects made the participants feel most like a scientist. Student responses were organized into categories and emergent themes to reveal that students most enjoyed taking part in outdoor science practices. Participants reported that science practices were the most influential elements of the outdoor science activities. Science practices were also most responsible for students to feel like scientists and led many students to enjoy the activities. Science content was most important and helpful and the hands-on data collection and analysis aspects of the activities were impactful. Finally, being outside fostered enjoyment of the science activities. Short outdoor activities can promote children's scientific interest and identity development. Using what we learned through deductively coding student responses, we can implement tools children found beneficial into future science activities to ensure participants experience enjoyment, learning, and feeling like a scientist.

Investigating Student Attitudinal Outcomes of a First-Year, Two-Semester Biology Course-based Undergraduate Research Experience (CURE)

Emma Throneburg, Natalie Christian, Connor Morozumi, Mikus Abolins-Abols, Jeffery Masters, and Rachel Pigg, University of Louisville, Louisville, KY

Participation in research experiences can improve undergraduate student attitudinal outcomes and retention, yet many barriers exist that prevent broad student participation in traditional research experiences. Implementing Course-based Undergraduate Research Experiences (CUREs) can reduce these barriers. Furthermore, CUREs incorporated into introductory courses reach students early in their academic career. In this study, we implemented a two-semester CURE within an introductory biology laboratory sequence. Using attitudinal surveys, we monitored students' scientific self-efficacy, science identity, and science community values. Additionally, we investigated how student attitudes might vary across demographic groups.

We found that student attitudinal gains occurred primarily after the first semester of the CURE, with scientific self-efficacy and science identity both increasing substantially. These gains were sustained after the second semester, which is noteworthy given the difficult new concepts covered (i.e., data analysis and scientific writing). Science community values remained high at all time points, suggesting that students' science values formed before college. Throughout CURE participation, scientific self-efficacy, science identity, and science community values varied only slightly or not at all between the demographic groups we investigated. This study demonstrates the effectiveness of a two-semester introductory biology CURE to improve and sustain student attitudes in science.

Discourse and Argumentation Promotes Learning During Collaborative Group Exams

S. Katherine Cooper, Jillian Arzoumanian, Michelle Osovitz, and Jeffrey Grim, University of Tampa, Tampa, FL; Suann Yang, SUNY Geneseo, Geneseo, NY

Collaborative Group Exams (CGEs) represent a specific implementation of student-centered learning aimed at transforming high-stakes assessments into collaborative learning experiences. Our current study focuses on student feedback to elucidate if sociocultural engagement underpins the performance gains seen with CGEs. We hypothesize that discourse and argumentation amongst peers are the causal mechanisms. Data from 834 students across 31 sections of biology courses at general education, introductory, and upper-level biology courses at a PUI were analyzed using a mixed-methods approach. Quantitative findings indicate that 74.6% of students reported CGEs consistently enhanced their learning experience. Qualitative analysis identified three primary themes in student responses: 1) discipline-specific content acquisition, 2) learning through peer discussion, and 3) development of soft skills. The findings show that discourse and argumentation during CGEs play a pivotal role in their effectiveness by promoting deliberative and disputative argumentation, therefore aligning with sociocultural learning theories. Thus, CGEs can be used to incorporate discourse and argumentation in STEM curricula, which in turn promotes deeper understanding and knowledge retention.

Defining Acceptance of Evolution: A Delphi Study

Taya Misheva and Jason Wiles, Syracuse University, Syracuse, NY and Sara Brownell, Arizona State University, Tempe, AZ

Evolution is firmly recognized as a core concept of biology, yet studies have found that biology students often do not accept evolution. As such, much of evolution education research aims to identify the causes of evolution rejection and to develop instructional strategies for increasing acceptance. This research relies upon surveys intended to measure evolution acceptance. Survey validity is an essential component of research quality, and a thorough definition of the construct of interest is critical for survey development and validity assessment. Thus, the purpose of this study was to develop a detailed, consensus-based definition of what constitutes "full acceptance of evolution" within the context of undergraduate biology education. We employed the Delphi method, in which a panel of experts was iteratively surveyed to establish a definition of evolution acceptance. As expert panelists reached a consensus definition, we found that (a) all agreed that evolution acceptance can be compatible with religious belief, and (b) "full acceptance" requires knowledge of certain aspects of evolution, including the shared ancestry of all life and existence of extensive supporting evidence for evolution. This definition provides a foundation for establishing a survey that more accurately assesses students' awareness of and assent with key aspects of evolution.

12:00PM–12:30PM CONT.

SPECIAL PROGRAMMING PRESENTED BY MINIPCR

1675-109539 Bacterial Transformation Made Easy with True Blue

Platinum Ballroom 1 • AP® Biology • Hands-on Workshop (30 min) • HS, 2Y, 4Y

Easy-to-implement genetic engineering and bacterial transformation activity. Rehydrate bacteria and transform without starter cultures! The protocol requires less than 45 minutes of class time and only requires ice and a pipette.

Alex Dainis, miniPCR bio, Cambridge, MA

1675-106366 Free Short Science Films that Engage Students, Promote Learning, and Support Inclusive Teaching Practices in the STEM Classroom

Platinum Ballroom 2 • Technology in the Classroom • Demonstration (30 min) • HS, 2Y, 4Y

In this session, you will learn about free short science films and related resources from Science Communication Lab that engage students, promote conceptual understanding, expand definitions of scientists, and illuminate the nature of science.

Shannon Behrman, Science Communication Lab, Berkeley, CA

1675-106316 Students' Use of and Attitudes Toward AI Use to Support Experimentation in an Introductory Biology Laboratory

Platinum Ballroom 7 • Technology in the Classroom • Paper (30 min) • 2Y, 4Y, GA

How do student use AI to support their lab work? What do students think about its use? We present qualitative and quantitative survey data from a large, introductory biology CURE lab to provide answers.

Donald French, Moria Harmon, and Aimee Elquist, Oklahoma State University, Stillwater, OK

1675-106558 Supporting Student Investigation without Losing the Plot: Practical Tips for Organizing and Supporting Semester-Length Projects

Platinum Ballroom 8 • Instructional Strategies • Hands-on Workshop (30 min) • HS, 2Y, 4Y

Long-term, independent investigations can be a source of rich science learning for students...and a challenge for instructors and students to manage. Come see strategies to make projects manageable and rewarding.

Julie Minbiole, Columbia College Chicago, Oak Park, IL and Stephen Traphagen, Oak Park and River Forest High School, Oak Park, IL

1675-106394 Integrating Sustainability: Teaching Biology with the UN Sustainable Development Goals

Platinum Ballroom 9 • Ecology / Environmental Science / Sustainability • Demonstration (30 min) • HS, 2Y, 4Y

This session aims to equip educators with strategies to integrate UN Sustainable Development Goals into diverse teaching settings, offering tools for alignment, administrative support, and collaboration among instructors for enhanced sustainability education.

Emily G. Weigel, Georgia Institute of Technology, Atlanta, GA

SPECIAL PROGRAMMING PRESENTED BY 10K SCIENCE

1675-110785 Engaging Students in Immersive VR Experiences Using Real-World Research and AI

Platinum Ballroom 10 • Technology in the Classroom; • Demonstration (30 min) • MS, HS, 4Y

Is VR here for good this time? Join us and hear from an educator using interactive VR to effectively communicate challenging STEM subjects, and learn how learning can be tracked in VR using AI.

Laura Lynn Gonzalez and Elizabeth Clark, 10k Science, Oakland, CA, and Tanya Buxton, Menlo School, Atherton, CA

12:45PM–1:45PM

NABT Lunch Break

Your conference registration includes a boxed lunch, which you can pick up outside the Grand Ballroom before joining a section event, meeting with friends, or finding a quiet spot to relax and recharge.

Tickets for your entrée selection were made with your registration. Please present your lunch ticket to staff to pick up your boxed lunch.

AP® Biology Section Luncheon

Platinum Ballroom 5 & 6 • AP® Biology • Meal Functions (60 min) • HS

Grab your lunch and meet other AP® Biology teachers in a friendly, informal setting to share insights, ask questions, and build community. You may even get to meet some of your favorite AP® colleagues in person. The luncheon includes a special presentation of the Kim Foglia AP® Biology Service Award.

Sponsored by minipcr bio®

Four-Year College & University Section Luncheon

Grand Ballroom E • General Biology • Meal Functions (60 min) • 4Y

Faculty, education researchers, graduate students, and anyone associated with four-year colleges and universities are invited to network with colleagues and learn about section programs and opportunities. There will also be a special presentation of the Four-Year College & University Section Awards.

Elementary and Middle-Level (K-8) Luncheon

Grand Ballroom G • General Biology • Meal Functions (60 min) • ELEM, MS

Grab your lunch and meet up with other awesome K-8 teachers at this informal networking lunch designed to help you connect with colleagues.

High School Level Luncheon

Platinum Ballroom 5 & 6 • General Biology • Meal Functions (60 min) • HS

If you teach funny freshmen, serious seniors, and everyone in between, you will want to grab your lunch, grab a seat, and connect with other high school biology teachers in this informal setting.

Sponsored by minipcr bio®

Two-Year College Section Luncheon

Grand Ballroom H - K • General Biology • Meal Functions (60 min) • 2Y

Join a supportive community of two-year college educators to share your strategies, your struggles, and your successes! The winners of the Two-Year College Biology Teaching Award and the Professor Chan Teaching Award will also be recognized.

2:00PM–4:00PM

15th Annual Biology Education Research Symposium

Platinum Ballroom 8 • Instructional Strategies • Symposium (2 hours) • 2Y, 4Y, GA

NABT is proud to present the 15th Annual Biology Education Research Symposium. Presentations were expected through a double-blind review process open to biology instructors and education researchers at all levels. The symposium format is traditional 15-minute presentations of papers by individuals or co-authors, followed by Q&A.

See page 32 for the full listing.

2:00PM–3:15PM

1675-106174 What Does Science Have to do with Race and Racism? A Curricular Approach to Anti-Racist Science Teaching

Gold Key I & II • JEDI / Inclusive Teaching Practices • Hands-on Workshop (75 min) • ML, HS, 2Y

What is race? During this session, we will introduce a curriculum for biology educators that explores how racism, the construct of race, the history of science, and human genetic variation intersect.

Jeanne Chowning and Hanako Osuga, Fred Hutch Cancer Center, Seattle, WA; Jason Foster, Evanston Township High School, Evanston, IL

2:00PM–3:15PM CONT.

1675-105854 Connecting with Your Community Through the Classroom: A SENCER Workshop

Grand Ballroom A & B • Instructional Strategies • Hands-on Workshop (75 min) • HS, 2Y, 4Y

Attendees will be introduced to the SENCER philosophy. Participants will align their program and course outcomes to the SENCER ideals, and we will provide a framework in which to modify or "sencerize" their course.

Virginia McHugh-Kurtz, Harper College, Palatine, IL; Heather R. Pelzel, University of Wisconsin-Whitewater, Whitewater, WI; Rachel Bergstrom, Beloit College, Beloit, WI

SPECIAL PROGRAMMING PRESENTED BY BIO-RAD

1675-109231 Ozempic and Semaglutide Science: Mastering Diabetes and Weight Loss

Grand Ballroom C & D • AP® Biology • Hands-on Workshop (75 min) • HS, 2Y, 4Y

Join our workshop to explore Ozempic's dual action on diabetes and weight loss. Learn about semaglutide's role in blood sugar and appetite regulation through hands-on ELISA simulations.

Damon Tighe, Bio-Rad Laboratories, Hercules, CA

SPECIAL PROGRAMMING PRESENTED BY HHMI

1675-108515 Heads or Tails? Modeling Cellular Signaling in Planarians with HHMI BioInteractive's Model Builder Tool

Grand Ballroom F • Science Practices • Hands-on Workshop (75 min) • HS, 2Y, 4Y

We'll explore BioInteractive's Model Builder tool to make sense of the underlying cell signaling that governs planarian regeneration. Participants will learn how to scaffold student models to enable self-assessment and promote rich discussion.

Amit Morris, Upper Canada College, Toronto, ON, Canada and Kasey Joy Christopher, Duquesne University, Pittsburgh, PA

SPECIAL PROGRAMMING PRESENTED BY EDVOTEK

1675-108200 Introducing Your Students to CRISPR with Sickle Cell Gene Editing

Orange County Ballroom 1 • Biotechnology • Hands-on Workshop (75 min) • HS, 2Y, 4Y

Explore Nobel Prize-winning CRISPR in our electrophoresis workshop! This powerful biotechnology breakthrough is making dramatic changes to human health RIGHT NOW. Dive into CRISPR biology with quick experiments modeling a cure for sickle cell anemia.

Danielle Snowflack, Edvotek, Washington, DC

SPECIAL PROGRAMMING PRESENTED BY BFW PUBLISHERS

1675-108471 Bedford, Freeman & Worth Grounded in Evolution: A Classroom Activity on the Evolutionary History of Flightless Birds

Orange County Ballroom 2 • AP® Biology • Hands-on Workshop (75 min) • HS, 2Y, 4Y

Biology educator James Morris shares an activity in which participants will build evolutionary trees and use them to test hypotheses about the evolutionary relationships and history of flightless birds, such as ostriches, kiwis, and cassowaries.

James Morris, Brandeis University, Waltham, MA

1675-106042 The American Association of Immunologists Presents: AAI Teachers Research Program–Immunology Lessons for the Classroom

Orange County Ballroom 3 • Microbiology & Cell Biology • Hands-on Workshop (75 min) • HS

Learn how to bring the excitement of immunology research to students in the classroom with units presented by teachers from the American Association of Immunologists Summer Research Program for Teachers.

Mike Criscitiello, Texas A&M University, College Station, TX

1675-109096 Writing for the ABT

Orange County Ballroom 4 • Instructional Strategies • Hands-on Workshop (75 min) • HS, GA

Join the editorial team of *The American Biology Teacher* for this interactive session designed to encourage and support prospective authors. Turn your idea for an article into an action plan.

William McComas, ABT Editor-in-Chief, University of Arkansas, Fayetteville, AR

2:00PM–3:15PM CONT.

SPECIAL PROGRAMMING PRESENTED BY MINIPCR

1675-109560 Genotype to Phenotype: A Hands-on PTC Taster Lab with Companion Digital Curriculum!

Platinum Ballroom 1 • AP® Biology • Hands-on Workshop (75 min) • HS, 2Y, 4Y

PTC tasting is a classic way to link genotype and phenotype. Use PCR and gel electrophoresis to determine if students have taster or non-taster alleles.

Alex Dainis, miniPCR bio, Cambridge, MA

1675-106368 From CRISPR to 23 and Me: Ethics and Possibilities in an Age of New Genetics

Platinum Ballroom 2 • Biotechnology • Hands-on Workshop (75 min) • HS

Techniques like CRISPR, mitochondrial transfer, and mRNA therapeutics have expanded possibilities for genetic manipulation. Together, we will explore how these techniques can energize the curriculum and challenge students to consider their social and ethical implications.

Kenneth R. Miller, Brown University, Rehoboth, MA

SPECIAL PROGRAMMING PRESENTED BY WISCONSIN FASTPLANTS

1675-108637 Practical Strategies for Embedding Student-Centered Plant Research in Undergraduate Courses

Platinum Ballroom 7 • Instructional Strategies • Hands-on Workshop (75 min) • 2Y, GA

Be inspired! Learn effective strategies and resources for integrating student-centered, place-based plant research into courses. Inspire students to pursue careers and academics in plant science, contributing to local and global science and agricultural challenges.

Hedi Lauffer and Dan Lauffer, Wisconsin Fast Plants, Larkspur, CO

1675-108732 The College Board Presents: They Didn't Write What They Thought They Said

Platinum Ballroom 9 • AP® Biology • Demonstration (75 min) • HS, 2Y, 4Y

Why do students struggle to write about the science they know? We will explore how teachers can improve students' writing by helping students transfer their verbal responses to written, improving students' ability to write science.

Catherine Walsh, The College Board, Alachua, FL and Chikezie O. Madu, White Station High School/University of Memphis, Memphis, TN

SPECIAL PROGRAMMING PRESENTED BY NCSE

1675-106223 Sustainable Climate Solutions

Platinum Ballroom 3 & 4 • Ecology / Environmental Science / Sustainability • Hands-on Workshop (75 min) • ML, HS, 2Y

The climate crisis is undeniably causing anxiety among young people. Engage with NCSE's free NGSS-aligned mini-storyline, which focuses on evidence-based solutions, and gain the confidence to implement these activities in your classroom.

Wendy Johnson and Blake Touchet, National Center for Science Education, Oakland, CA

3:30PM–4:00PM

1675-106511 Shaping the Future: Using Interdisciplinary Collaboration to Advance Quantitative Biology Education at Community Colleges

Grand Ballroom A & B • General Biology • Hands-on Workshop (30 min) • HS, 2Y, 4Y

The Quantitative Biology at Community Colleges (QB@CC) network will be showcased as a model for building interdisciplinary communities of practice. Participants will engage in collaborative activities that strategize network building.

Melanie K Lenahan, Raritan Valley Community College, Clinton, NJ; Jennifer Adler, Maysville Community & Technical College, Maysville, KY; Heather Zimbler-DeLorenzo, Georgia State University, Atlanta, GA; Sheela Vemu, Waubonsee Community College, Sugar Grove, IL; Vedham Karpakakunjaram, Montgomery College, Rockville, MD; Adronisha Frazier, Northshore Technical Community College, Lacombe, LA

SPECIAL PROGRAMMING PRESENTED BY BIO-RAD

1675-109232 CRISPR–Now and Beyond

Grand Ballroom C & D • Biotechnology • Paper (30 min) • HS, 2Y, 4Y

Delve into CRISPR's evolving landscape in our talk, highlighting breakthroughs like precise gene therapy techniques, advanced delivery systems, and innovative agricultural applications designed for biology educators' professional development.

Damon Tighe, Bio-Rad Laboratories, Hercules, CA.

3:30PM–4:00PM CONT.

SPECIAL PROGRAMMING PRESENTED BY HHMI

1675-108516 Sharing Classroom-Ready Materials in the HHMI BioInteractive Educator Resource Library

Grand Ballroom F • Curriculum Development • Hands-on Workshop (30 min) • GA

Did you know BioInteractive's Online Community features an Educator Resource Library with classroom-ready, member-generated materials? Join us as we discuss how to use and contribute to this repository of activities connected to BioInteractive resources.

Kristine Grayson, University of Richmond, Richmond, VA

SPECIAL PROGRAMMING PRESENTED BY ALGAE RESEARCH SUPPLY

1675-109642 Algae Beads and Brainy Brinys (Algae Culture and Brine Shrimp Experiment Kit)

Orange County Ballroom 1 • AP® Biology • Hands-on Workshop (75 min) • ML, HS, 4Y

We will play with algae beads for photosynthesis and respiration and with Brainy Brinys, a kit to grow algae and feed it to brine shrimp while quantifying everything!

Matthew Huber and Daphne Warren, Algae Research and Supply, Inc., Carlsbad, CA

SPECIAL PROGRAMMING PRESENTED BY BFW PUBLISHERS

1675-108474 Bedford, Freeman & Worth Get AP® Biology and AP® Environmental Science Ready with BFW Publishers

Orange County Ballroom 2 • AP® Biology • Demonstration (30 min) • HS

Discover the impact of BFW Publishers' AP® Science programs, "Biology for the AP® Course" and "Environmental Science for the AP® Course." Explore innovative teaching methods, student features, CED alignment, AP® practice, skills, and a teacher's program.

Thomas Menna, BFW Publishers, Hamilton, NJ

1675-109777 Using Scientific Legacy to Inspire Learning

Orange County Ballroom 3 • Nature of Science • Demonstration (30 min) • ML, HS, GA

Student engagement is important for learning. We'll share resources to help! Watch our new seven-minute, animated historical film and get ideas for engaging students in science through history and language arts.

Charlotte A. Moser, Vaccine Education Center/ Children's Hospital of Philadelphia, Philadelphia, PA and Donald R. Mitchell, Vaccine Makers Project, VEC at CHOP, Philadelphia, PA

SPECIAL PROGRAMMING PRESENTED BY MINIPCR

1675-109552 miniPCR Presents: Tools and Activities to Implement Genetics Research in Advanced High School or Undergraduate Biology Course

Platinum Ballroom 1 • General Biology • Demonstration (30 min) • HS, 2Y, 4Y

Explore robust experiments with simple implementation that can be expanded into authentic research questions relevant to advanced high school or undergraduate biology coursework.

Ally Huang, miniPCR bio, Cambridge, MA

1675-107865 Enhancing Understanding of Evolution by Promoting Metacognitive Awareness and Self-Regulation of Intuitive Thinking

Platinum Ballroom 2 • Evolution • Hands-on Workshop (30 min) • HS, 2Y, 4Y

The participants will learn about and try innovative approaches to enhancing students' understanding of evolution. Explicitly addressing students' unscientific intuitive ideas has proven to be highly successful in this regard, and learning materials will be presented. This session is a special presentation by the 2024 Huxley Award Winner.

Tim Hartelt, University of Kassel, Kassel, Germany

3:30PM–4:00PM CONT.

SPECIAL PROGRAMMING PRESENTED BY NCSE

1675-108466 NCSE Climate Change Story Shorts

Platinum Ballroom 3 & 4 • Ecology / Environmental Science / Sustainability • Hands-on Workshop (30 min) • ML, HS, GA

NCSE has developed NGSS-aligned lessons to teach about climate change. Teachers will be introduced to our Story Shorts–mini-storylines that can be completed in five class periods or expanded through optional Side Quest activities.

Wendy Johnson and Blake Touchet, National Center for Science Education, Oakland, CA

1675-106479 Growing Knowledge: Harnessing Hydroponics & Aquaponics for Hands-on Learning in the Classroom

Platinum Ballroom 7 • AP® Environmental Science • Demonstration (30 min) • ML, HS, 2Y

Dive into hydroponics and aquaponics for hands-on learning! Explore curriculum connections, skill development, and community integration. Discover low-cost setups for diverse classrooms and leave ready to inspire curiosity, creativity, and sustainability in your school.

Kelsey Kaiser and Michelle Zhang, Oak Park & River Forest High School, Oak Park, IL

1675-106535 The CURE for High School Labs

Platinum Ballroom 9 • AP® Biology • Hands-on Workshop (30 min) • HS

Come join your fellow AP® and IB Bio teachers to dream and design the possibilities for science that extends past the 47 minutes of a single-period day following the CURE Model (Curricular Undergraduate Research Experiences) of college courses.

Brenda Campbell Royal, Central Magnet School, Murfreesboro, TN

SPECIAL PROGRAMMING PRESENTED BY ANATOMAGE

1675-109719 Adapting Traditional Science Labs to Modern Interactive Simulations with the Science Table by Anatomage

Platinum Ballroom 10 • General Biology • Demonstration (30 min) • HS, 2Y, 4Y

The Science Table displays biology experiments with realistic-quality visuals on an interactive seven-foot-long touchscreen table. The workshop will focus on incorporating these experiments into middle school, high school, and college-level classrooms.

Zach Bryant, Anatomage, Inc., Santa Clara, CA

4:00PM–5:00PM

1675-110737 Student Poster Practice Session

Platinum Ballroom 8 • Instructional Strategies • Demonstration (60 min) • HS, 2Y, 4Y

Join other student poster presenters (and their mentors) for some informal practice to help you prepare for the NABT Biology Education Poster Session.

Michael Moore and Rachel Pigg, NABT Biology Education Poster Session Coordinators

4:00PM–5:30PM

Exhibit Hall Closing Experience

Marquis Ballroom • Special Event • GA

It's last call in the NABT Exhibit Hall. It's also your last chance to visit booths, talk to exhibitors, and get those freebies for the classroom. This special reception will include special guests, giveaways, and the grand prize drawing for the "Find the President" Contest.

5:00PM–7:00PM

HHMI Night at the Movies

Platinum Ballroom 5 & 6 • Special Event • GA

Join HHMI Tangled Bank Studios for a sneak peek of their upcoming film *WILD HOPE: MISSION IMPOSSIBLE*, which tells the inspiring story of how a late-career epiphany led Stanford University biochemist Pat Brown to abandon his academic career and commit himself to fighting global warming and biodiversity collapse, starting with a surprising product—an impossibly delicious plant-based hamburger. Through groundbreaking science and unwavering commitment, Pat's mission transformed the culinary landscape—and provided real hope for a more sustainable and ethical food system.

Following the screening, hear from Pat himself during an audience Q&A and get the inside scoop on what he sees as the next big solution in the fight against climate change. Learn more about the Wild Hope movement at Wildhope.tv.

Popcorn, drinks, and an assortment of snacks will be available for your movie experience.

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