68th Annual Meeting
October 18th- 19th, 2024

Hosted by

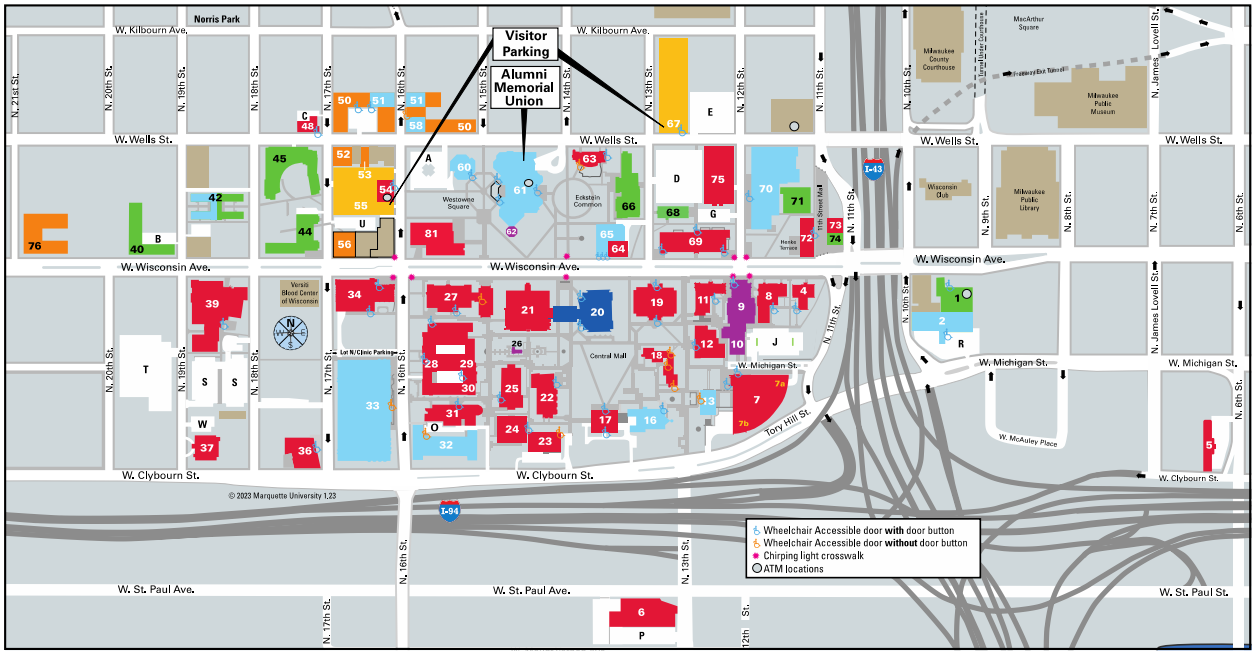
Marquette University
Milwaukee, WI

The conference will take place in:
Marquette University Raynor Memorial Library
1355 W Wisconsin Ave, Milwaukee, WI 53233
http://www.marquette.edu/

Driving Directions

From MKE airport: Take WI-119 W (signs for Interstate 94/ Milwaukee/Chicago). Take the exit toward Milwaukee. Merge on I-94 W. Continue onto I-43 N. Take exit 72A for Michigan St/10th St. Continue onto N. 10th. Turn left onto W. Wisconsin Ave. Turn right on 16th street. Parking structure is on your left.	From Chicago: I-94W. Continue to I-43 N. Take exit 72A for Michigan St/10th St. Continue onto N. 10th. Turn left onto W. Wisconsin Ave. Turn right on 16th street. Parking structure is on your left.

MARQUETTE UNIVERSITY – **Visitor Campus Map**



Academic/Administrative Buildings

313 Building 6
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707 Building 72
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Athletic and Human Performance Research Center 75
Carpenter Tower 73
Clark Hall 31
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O'Brien, Dr. E. J., Jesuit Residence 63
Physician Assistant Studies Building 36
Schroeder Complex, College of Health Sciences, College of Education 29
Sensenbrenner Hall, Klingler College of Arts and Sciences 4
Service Building 23
Straz, Jr., David A., Hall College of Nursing 12
Todd Wehr Chemistry Building 22
Wehr Life Sciences Building 24
William Wehr Physics Building 25
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Churches/Chapels

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Libraries

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Art/Entertainment/Recreation Facilities

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University Apartment Buildings

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Gilman Building 52
The Marq 76
McCabe Hall 56

University Information – 414.288.7250

Updated May 2024

MARQUETTE UNIVERSITY | BE THE DIFFERENCE.

Parking: The 16th St. structure (#55), or Wells St. structure (#67)

Conference Location: Raynor Library (#20)

Wifi Access

Campus visitors can use MU Guest Wi-Fi to access the internet.

- Select **MU Guest** from your device's Wi-Fi settings
- The MU Guest Acceptable Use Policy page appears.
- Review the terms and conditions. When you scroll through them, the Accept button becomes actionable. If you agree, click or tap **Accept**.

For MU Guest Wi-Fi assistance

- Call the IT Services Help Desk at (414) 288-7799

ACUBE's 68th Annual Meeting Program Overview

Most sessions take place in Raynor Library,
All indicated times are Central Standard Time (CST).

Friday, October 18th
11:00 am - 1:00 pm ACUBE Steering Committee Meeting

12:00 pm - 1:00 pm Registration
1:00 pm - 1:30 pm Welcoming Remarks and Meeting Orientation
Session A- 90-Minute Workshops
1:30 pm - 3:00 pm Two Concurrent workshops
3:00 pm - 3:05 pm Break
Session B- 20- minute presentations
3:05 pm - 4:05 pm Sequential 20-minute presentations
4:05 pm - 4:10 pm Break
Session C- 40-minute presentations
4:10 pm - 5:30 pm Sequential 40-minute presentations
Evening Session - Alumni Memorial Union (AMU)
6:00 pm - 7:00 pm Poster Session and Social Hour
7:00 pm - 7:30 pm Bioscene information Session
7:30 pm - 9:00 pm Dinner, Award presentation

Saturday, October 19th
In Person-Session
8:00 am - 9:30 am Registration
8:00 am - 9:30 am Continental Breakfast- Raynor Library
8:30 am - 9:30 am Morning Brew: An Intimate Discussion on Preparing for A Teaching Career Post-PhD
Session A- 90-Minute Workshop
9:30 am - 11:00 am **90-minute Workshop**: Models and Modeling: Tools of Engagement
11:00 am - 11:05 am Break
Session B- Concurrent presentations
11:05 am - 12:05 pm 40-minute presentation
11:05 am - 12:05 pm Sequential 20-minute presentations

12:05 pm - 1:15 pm Lunch and ACUBE business meeting

Keynote Speaker Workshop (hybrid presentation)
1:15 pm - 2:30 pm Keynote speaker workshop
2:35 pm - 3:05 pm Optional Q&A follow up Discussion

Virtual Sessions:
2:30 pm - 6:00 pm MS Teams Presentations
Session C- Virtual Sequential Presentations (40 minutes)
2:30 pm - 3:50 pm Sequential 40-minute presentations

3:50 pm - 3:55 pm Break

Session D- Virtual Sequential Presentations (20 minutes)

3:55 pm - 4:55 pm Sequential 20-minute presentations
4:55 pm - 5:00 pm Break

Session E- Virtual poster Presentations

5:00 pm - 5:40 pm Virtual poster presentations (different breakrooms)
5:40 pm - 6:00 pm Conference conclusion and closing remarks
6:00 pm - 7:30 pm Steering Committee meeting (for committee members)

Our Mission

Members of ACUBE share ideas and address the unique challenges of balancing teaching, research, advising, administration, and service. We are a supporting and mentoring community that provides professional development opportunities to:

- Develop and recognize excellence in teaching
- Incubate new and innovative teaching ideas
- Involve student research in the biology curriculum
- Advise and mentor students in and out of the classroom
- Enhance scholarship through our national, peer-reviewed journal, *Bioscene.*

Governance

President, Ashley Driver, University of Scranton
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JT Cornelius, Indiana University School of Medicine, Bloomington
Cassandra Korte, Lynn University
Luciana Caporaletti, Penn State Wilkes-Barre

Local Arrangements Chair and Program Chair Khadijah (Gigi) Makky, Marquette University

BIOSCENE

ASSOCIATION OF COLLEGE AND UNIVERSITY BIOLOGY EDUCATORS

Bioscene is the official peer-reviewed journal for the Association of College and University Biology Educators (ACUBE).

Looking to share your approaches or experiences teaching in the biological sciences?

Bioscene publishes content including:

- ⇒ Articles: Course and curriculum development, innovative and workable teaching strategies that include some type of assessment of the impact of those strategies on student learning.
- ⇒ Innovations: Laboratory and field studies that work, innovative and money-saving techniques for the lab or classroom. These do not ordinarily include assessment of the techniques' effectiveness on student learning.
- ⇒ Perspectives: Reflections on general topics that include philosophical discussion of biology teaching and other topical aspects of pedagogy as it relates to biology.
- ⇒ Reviews: Web site, software, and book reviews
- ⇒ Information: Technological advice, professional school advice, and funding sources.
- ⇒ Letters to the Editor: Letters should deal with pedagogical issues facing college and university biology.

Cost to publish: Free!

For more information visit

https://www.acube.org/bio.phb

Follow the QR code for author submission guidelines

Keynote Speaker: Dr. Julia Metzker

Biography

Dr. Julia Metzker is a passionate advocate for transformative liberal arts education, with a distinguished career in educational development, course design, and assessment. With a keen interest in developing engaging courses that are the building blocks of a transformative college experience, Julia has led initiatives to reform general education and implement successful university-wide programs. Julia's early work in science education and civic engagement created a foundation for her work in professional development focused on learning. Julia is a co-author Designing Learning Experiences that Matter: A Field Guide to Course Design for Transformative Education (2021), which received an Outstanding Book honorable mention from the Society of Professors of Education.

JuliA currently serves as the Director of the Washington Center for Improving Undergraduate Education at Evergreen. As a public service center at Evergreen, The Washington Center is a national resource to higher education institutions for creating equitable learning opportunities for all students through consulting, mentoring, activities, trainings, and initiatives. Julia received her B.S. in chemistry from The Evergreen State College and pursued her Ph.D. in inorganic chemistry at the University of Arizona.

Keynote Address:

Cultivating Inclusive and Culturally Sustaining Classrooms (What's Your Teaching Manifesto?)

This plenary talk invites participants to take their next step toward becoming inclusive and culturally sustaining educators. Through self-reflection, you will develop a teaching manifesto that articulates your vision and values. Along the way, we will explore practical strategies, such as transparent assignments, relationship-building activities, and responsive feedback techniques. We will also discuss the importance of investing in ourselves so that we have the capacity to build classroom environments where students with diverse educational histories and cultural identities feel they belong. As you navigate the day-to-day challenges of teaching when you return to the classroom, the teaching manifesto promises to be a source of inspiration, reminding you of your commitments to yourself and your students.

68th Annual ACUBE Meeting Program
Marquette University
Milwaukee, Wisconsin
October 18th-19th, 2024

Friday, October 19th, 2024	
11:00 AM - 1:00 PM Steering Committee Meeting (for committee members)	Raynor Library
12:00 PM - 1:00PM Registration / Light lunch will be provided	Raynor Library
1:00 PM - 1:30 PM Welcoming Remarks and conference information	Beaumier Suite B-C
1:30 PM - 3:00 PM Session A- Concurrent workshops (90 minutes) **a- Exploring Natural Selection in Humans Using BioInteractive's Sickle Cell Resources - for your reference.** Jonelle Orridge and Nilo Marin, Broward College **b- Investigating Climate Change through National and Local Case Studies with HHMI BioInteractive Resources"** Tara Jo Holmberg, HHMI BioInteractive	Beaumier Suite B-C Raynor Library 3rd floor RM330
3:00 PM - 3:05 PM Break	
3:05 PM - 4:05 PM Session B- Sequential presentations (20 minutes) **a- Emphasizing the challenges of scientific communication using an icebreaker activity** Ashley Driver, University of Scranton **b- Getting students to be "Wimpy Wimpy Wimpy:": Weekend Assignment for Key Concepts in an Anatomy and Physiology Course** Sarah Lovern, Concordia University of Wisconsin **c- U-RISE at MU's Approach to Broadening Participation in Biomedical PhD programs and Research** Laurieann Klockow, Marquette University	Beaumier Suite B-C
4:05 PM - 4:10 PM Break	
4:10 PM - 5:30 PM Session C- Sequential Presentations (40 minutes) **a- A Walk in the Park: A Botanical Field Research Project for Biology Students.** Luciana Caporaletti, Penn State University **b- Exploring Math in Biology: Perspectives of Two-Year College Educators** Kristine Squillace Stenlund, University of Minnesota and Dakota County Technical College	Beaumier Suite B-C

Friday, October 18th, 2024, Evening Session At the Alumni Memorial Union (AMU) 2nd Floor	MU Visitor Campus Map #61
6:00 PM - 7:00 PM Poster session and social hours **Poster Presentations** **a- Effects of student demographics on self-identity as a scientist in course-based research modules** Christopher Yahnke, University of Wisconsin- Stevens Point **b- Leveraging the Benefits of the Digital Era: Identifying the value of Non-Traditional Learning Methods** Brook Greiner, Medical College of Wisconsin **c- Incorporating Conversations on Diversity, Equity, and Inclusion into the Undergraduate Research Experience** Gabriella Marino, Marquette University **d- Enhancing Belonging for Underrepresented Students through Student-Designed Learning Field Experiences** Brian R. Shmaefsky, Lone Star College – Kingwood	
7:00 PM - 7:30 PM Bioscene Presentation	
7:30 PM - 9:00 PM Dinner and Award presentations	
Saturday, October 19th 2024	
8:00 AM- 2:30 PM **In Person Session**	
8:00 AM - 9:30 AM Registration and Continental Breakfast ***Beaumier Suite B-C*** *(at 8:30)* Graduate Students and Post-Docs Special Session **Morning Brew: An Intimate Discussion on Preparing for A Teaching Career Post PhD** Nouran Amin, Ball State University JT Cornelius, Indiana University School of Medicine, Bloomington ***Raynor Library 3rd floor RM-330***	
9:30 AM - 11:00 AM. Session A- 90-minute Workshop **a- Models and Modeling: Tools of Engagement** Tim Herman, 3D Molecular Designs	Beaumier Suite B-C

11:00 AM - 11:05 AM Break **11:05 AM - 12:05 PM Session B- Concurrent 40- minute and 20- minute presentations** <u>40- minute presentation</u> **a- Preparing Graduate Students for Teaching Through a Certificate in University Teaching Program** George Todd, University of Missouri-St. Louis <u>20- minute sequential presentations</u> **a- Welcoming underrepresented minority undergraduate students into formal medical and scientific spaces.** Emma Tillison, Medical College of Wisconsin **b- Midsemester feedback is an essential tool for a first-time teacher** Carrie Hetzel, Harvard University **c- Co-Teaching to bridge the gap between introductory-level and upper-division biology courses at a four-year institution** Takunda, Syracuse University	Raynor Library 3rd floor RM-330 Beaumier Suite B-C
12:05 PM - 1:15 PM Lunch and ACUBE Business meeting	Beaumier Suite B-C
Keynote Address Dr. Julia Metzker **Director of the Washington Center for Improving Undergraduate Education at Evergreen**	
1:15 PM - 2:30 PM Keynote Address **Cultivating Inclusive and Culturally Sustaining Classrooms** **MS Teams Link: Keynote Address** **2:35 PM - 3:05 PM Optional Q&A Follow Up Discussion** Moderator: Ashley Driver, President of the ACUBE **MS Teams Link: Keynote Address Discussion to follow**	Beaumier Suite B-C Raynor Library 3rd floor RM-330
2:30 PM - 3:50PM Session C- Virtual sequential presentations (40-minutes) **MS Teams Link**: 40- and 20 minute presentations **a- An Intriguing Intersectionality: The Role of Medical Experiences and First-Generation Status** Brittney N. Wyatt, Porter Bischoff, Clayton Rawson, Kody Garrett, Joshua Premo	Beaumier Suite B-C

b- Difficult Conversations, Real Biology: Student essentialist beliefs of race and biological sex Josh Premo, Saskia Paepke-Chile, T. Heath Ogden, Jessica Cusick, & Brittney Wyatt, Utah Valley University	
3:50 PM - 3:55PM Break	
3:55 PM - 4:55 PM Session D- Virtual sequential presentations (20-minutes) **MS Teams Link: 40 and 20 minute presentations** (Same link as session C) **a- Enhancing Student Engagement in College Biology: Leveraging Miro Virtual Whiteboards for Interactive Learning** Gaston Jofre-Rodriguez, Virginia Commonwealth University **b- Natural transformation of antibiotic resistance as a microbiology lab experiment** James F. Graves, University of Detroit Mercy **c- Is Tori seeing red? An activity to reveal the complexities hiding behind human pedigree charts.** Ahmad Mohammed Kamal, Si-ah Choi, Aoniya Colynn, Ashleigh Wood, Pamela Kalas University of British Columbia	Beaumier Suite B-C
4:55 PM - 5:00PM Break	
5:00 PM - 5:40PM Session E- Virtual Poster Presentations **MS Teams Link: Virtual Poster Presentations** **a- Enhancing Student Engagement in Biology Courses Using a Real-World Case Study** Dr. Dan Kiernan and Dr. Pearl Fernandes Division of Science, Mathematics, & Engineering, University of South Carolina, Sumter - A Palmetto College Campus **b- Collaborative Learning Environments: The dynamics that matter.** Connor Mackintosh, Zaira V. Meza-Leon, Brittney N. Wyatt, & Joshua Premo Utah Valley University **c- Leveraging Generative AI in Computational Biology Education** Camellia Moses Okpodu, University of Wyoming **d- Exploring Study Strategies in Introductory Biology Courses** Zaira V. Meza-Leon, Eden Backman, Molly Niswender, Jeremy L. Hsu, Joshua Premo, & Brittney N. Wyatt, Utah Valley University	Beaumier Suite B-C
5:40 PM - 6:00 PM Conference Conclusion and Closing Remarks **MS Teams Link: Closing Remarks**	Beaumier Suite B-C
6:00 PM - 7:00 or 7:30 PM Steering Committee Meeting (for committee members)	

ABSTRACTS BY CATEGORY

90-minute Workshop Presentations and Special Sessions

Exploring Natural Selection in Humans Using BioInteractive's Sickle Cell Resources - for your reference.
Jonelle Orridge and Nilo Marin, Broward College
Natural selection is often a challenging concept for students. This workshop will provide participants with impactful classroom resources and teaching strategies that enhance their ability to integrate natural selection into the teaching of evolution. Utilizing resources from HHMI BioInteractive, participants will engage as learners to identify and appreciate the significance of sickle cell disease in human populations and its application to biology concepts. There will be opportunities to identify how this phenomenon can be used to expand and elucidate the concept of natural selection. Participants will also explore and discuss teaching strategies to assist students in their comprehension of natural selection and evolution. This workshop will blend multimedia resources with hands-on learning activities to create an engaging and effective learning experience.

Investigating Climate Change through National and Local Case Studies with HHMI BioInteractive Resources
Tara Jo Holmberg, HHMI BioInteractive
Curious about how to incorporate climate change into your course through active learning? This workshop will feature national and local case studies on impacts from, adaptations to, and mitigation of climate change, utilizing HHMI BioInteractive resources and traditional ecological knowledge (TEK). Participants will integrate real-world data, interactive tools, and TEK, to explore the complex dynamics of climate change across diverse geographical regions, combining empirical research with educational strategies to enhance climate science understanding among students. Case studies highlight various ecosystems and communities, offering insights into both universal and unique climate change challenges, as well as improved climate literacy, critical thinking, and proactive engagement outcomes in addressing environmental issues. This workshop underscores the importance of localized study within the global climate context, advocating for a holistic approach to climate education.

Models and Modeling: Tools of Engagement
Tim Herman, 3D Molecular Designs
The first challenge facing educators in the molecular biosciences is student engagement. How do we capture students' interest in the subject we are presenting? We have found that one answer to this question is the use of models and the process of modeling. Participants in this workshop will have a hands-on experience with several foundational models that have proven to be effective in capturing students' attention. Foundational models include:

- 3D-printed models of proteins… based on the atomic coordinates of solved protein structures.
- Interactive schematic models of proteins… that students can fold into 3D shapes following basic principles of chemistry
- A Dynamic DNA Discovery Kit… that can be constructed from its 3 basic components
- A Flow of Genetic Information Kit… that students can use to model the processes of DNA replication, RNA transcription and Protein Synthesis
- Cellular Landscapes of David Goodsell… that provide students with a unique view of the proteins in a cell as they carry out the molecular processes of life.

Participants will also be introduced to a series of recently developed Augmented Reality tools that enhance these physical models with overlayed information when viewed through a students' cellphone.

Morning Brew: An Intimate Discussion on Preparing For A Teaching Career Post-PhD
Facilitated By:
Nouran Amin, Assistant Teaching Professor of Biology at Ball State University,
JT Cornelius, a doctoral candidate at Indiana University School of Medicine
Deciding to pursue a teaching career after completing your PhD can be both exciting and challenging. Join us for a delightful breakfast session tailored specifically for graduate students considering a teaching career.
Whether you're just beginning to explore teaching opportunities or are actively preparing to apply, this session will serve as a safe space to connect with others who share your career aspirations and provide valuable insights into preparing yourself to transition from graduate school to a teaching role.
During the interactive session, we will offer practical guidance on navigating the academic job market, crafting compelling application materials, and preparing for interviews. The format will also include a Q&A segment where participants can ask questions and engage in meaningful dialogue about the realities of teaching careers in higher education.

20-minute Presentations

In- Person presentations

Friday, October 18th, 2024

Emphasizing the challenges of scientific communication using an icebreaker activity
Ashley Driver, University of Scranton
Effectively communicating scientific information is essential not only for advancing a specific field, but also building key relationships between researchers and society. One of the key challenges of this is the ability to translate highly technical terms into digestible concepts. Within my Cellular Biology course, I have found that students often underestimate this challenge. Therefore, I emphasize the importance of effectively translating biological terms early in the semester using a simple icebreaker activity. This activity combines the methodology of the party game Telestrations with increasingly technical biological terms. In this multi-round activity students are challenged to draw and communicate using limited information. This in turn pushes students to not only think creatively about how to depict scientific terms, but also realize the difficulty in doing so. Moreover, this game can result in humorous results that get students interacting early in the semester which helps break tension and promote an interactive learning environment.

Getting students to be "Wimpy Wimpy Wimpy:": Weekend Assignment for Key Concepts in an Anatomy and Physiology Course
Sarah Lovern, Concordia University of Wisconsin
In an effort to have students engage with the materials over the weekend instead of ignoring the class for several days, "Weekend Interaction with the Material Projects" (WIMPs) were implemented into an Anatomy and Physiology II course in the fall of 2023 and fall 2024. Students were given optional short videos to watch with bonus questions. These videos were often related to pop culture and limited to two minutes or less. Students then used the videos, class information, and additional research to answer the questions. Data was collected on student completion rate and answering correctly as well as a correlation with exam grades and final course grade. Additionally, a post-class survey was conducted to understand student perception of the WIMPs. Feedback was overwhelmingly positive. Students liked doing the assignment, diving deeper into the material, and that the assignments were optional. Some students disliked that the questions were challenging and would also forget to do them. Examples of the videos, questions, and the data will be presented.

U-RISE at MU's Approach to Broadening Participation in Biomedical PhD programs and Research
Laurieann Klockow, Marquette University
The U-RISE at MU program, funded by the National Institutes of Health (NIH), aims to broaden participation in biomedical PhD programs and research by enhancing research training and professional development for

underrepresented students in STEM disciplines. Implemented at Marquette University in 2021, the program adopts a comprehensive approach to equip students with the skills necessary for the successful attainment of a PhD and independent research careers. At its core, U-RISE offers a continuous two-year research experience under the guidance of research-active mentors trained in inclusive practices. The program's curriculum is multifaceted, incorporating hands-on laboratory experience, professional development workshops, a grant writing bootcamp, and a seminar course series to enhance the laboratory experience using a culturally validating curriculum. These elements work in tandem to foster critical thinking, problem-solving skills, and a strong sense of belonging among participants.

A key feature of U-RISE is its mentoring ecosystem, which establishes a network of support including faculty research mentors, professional development advisors, and graduate student peer mentors. This structure provides personalized guidance tailored to individuals at their unique stage of development. Because positive mentor-trainee relationships predict long-term success (Balster et al., 2010) the program emphasizes structured activities to enhance mentor-mentee relationships, including individual development plans and mentor-trainee contracts. To address the unique challenges faced by underrepresented students, U-RISE employs a culturally validating curriculum focusing on integrating cultural perspectives into the scientific discourse, promoting student confidence and sense of belonging. The program also recognizes the importance of family and social support, engaging scholars' families and friends through events like U-RISE Research Day. These interventions aim to increase persistence in STEM fields (Romero et al., 2020).

Early outcomes from Marquette's U-RISE program are promising. All students in the first cohort were admitted to competitive summer research programs and graduated within four years. Three out of four scholars continued to graduate school or NIH postbac programs (1 student chose to leave the program to pursue a biomedical career unrelated to PhD attainment). Participants reported improvements in confidence, research competency, and readiness for graduate-level education, as well as an increased sense of belonging and research self-efficacy.

The U-RISE program at Marquette University demonstrates a successful model for fostering diversity in the biomedical workforce, ensuring that underrepresented voices contribute meaningfully to scientific advancement.

Balster, N., Pfund, C., Rediske, R., & Branchaw, J. (2010). Entering Research: A Course That Creates Community and Structure for Beginning Undergraduate Researchers in the STEM Disciplines. *CBE Life Sciences Education*, *9*(2), 108–118. https://doi.org/10.1187/cbe.09-10-0073

Romero, D. R., Gonzalez, M., Clark-Ibanez, M., & D'Anna-Hernandez, K. (2020). A Culturally Validated Model of Student Success Services and Academic and Curriculum Enhancements at a Hispanic-Serving Institution. *Association of Mexican American Educators Journal*, *14*(3), Article 3. https://doi.org/10.24974/amae.14.3.401

Saturday, October 19th, 2024

Welcoming underrepresented minority undergraduate students into formal medical and scientific spaces
Emma Tillison, Medical College of Wisconsin
Abstract: The Medical College of Wisconsin (MCW) has many different pathway programs that engage underrepresented in medicine (URiM) students who are interested in pursuing medical or graduate school or other professional degrees. One such academic-year program at MCW is the Student Enrichment Program for Underrepresented Professions (StEP-UP) college program. As educators, the goal is to provide these students with many opportunities to connect with scientific or medical spaces for professional development. However, further

exploration into how we can make the students feel welcome and give them a sense of belonging in these spaces once they are invited is required. In this presentation, we will describe the experiences of a graduate-level organizer and educator for StEP-UP, highlighting key sessions that received high praise from participants. Specifically, the presentation will describe one specific event where 10 pathway program undergraduate students were invited to MCW's 2023 Department of Medicine Research Retreat. Post-event feedback students in attendance will be discussed, using their perspectives to guide how MCW can provide more welcoming opportunities for URM students to enter into formal medical research spaces.

Midsemester feedback is an essential tool for a first-time teacher
Carrie Hetzel, Harvard University
Teaching as the sole instructor for a course for the first time can be extremely daunting. In Spring 2023, I had the opportunity to serve as an adjunct instructor in microbiology at Simmons University. Amongst the day to day of preparing lecture materials, developing assessments, and answering student emails, it was hard to know what I was doing well and what I could be improving. In this presentation, I will discuss how I collected, interpreted, and implemented student feedback through a mid-semester survey, and the describe the effects this had on the second half of my course. I hope this will serve as a guide both for other novice instructors that are teaching independently for the first time, and for more experienced mentor teachers who may be looking for new ways to help their mentees build confidence in their teaching.

Co-Teaching to bridge the gap between introductory-level and upper-division biology courses at a four-year institution
Takunda, Syracuse University
Students in postsecondary biology courses often expect to operate on the basis of rote memorization for a particular exam; rather than toward long-term understanding, critical analysis, synthesis, and application of content material. However, short-term memorization of facts about a concept does not equate to an applicable understanding. Moreover, biology departments and upper-division faculty often expect that introductory courses will establish foundational knowledge through higher-order thinking that students are expected to build upon in advanced courses. Students tend to compartmentalize information from introductory courses, struggling to recall or apply it in subsequent courses. Team-instruction, or Co-Teaching, is a teaching model that relies on multiple instructors to achieve the learning objectives for a given course. Through the literature, we see that co-teaching is associated with increased student engagement in the classroom, but the connection between increased engagement and student performance in courses is much less understood. To bridge contexts between introductory-level courses and upper-division courses, we **propose a co-**teaching model whereby the prerequisite content of upper-division courses is taught in introductory courses by the instructors who teach the follow-on courses to emphasize the connections between introductory and advanced courses. For this study, a faculty member who teaches the second-year genetics course at a large, private, research-intensive university in the Northeastern United States was taught the concepts in the introductory course that are considered foundational for learning in the genetics course, making sure to relate the introductory content to the upper-division course. We incorporated exam questions designed by the invited faculty member that would appear on their course's exams into the exam for the introductory course. Using a nonequivalent control-group design, we compared student performance in iterations of the introductory course with and without direct interaction with the upper-division faculty member. Quantitative analyses were complemented by qualitative surveys gauging student perceptions of the experience and potential impacts.

Virtual 20-minute Presentations

Enhancing Student Engagement in College Biology: Leveraging Miro Virtual Whiteboards for Interactive Learning
Gaston Jofre-Rodriguez, Virginia Commonwealth University
The integration of digital tools in education has transformed traditional teaching methods, enhancing student engagement and learning outcomes. Virtual whiteboards facilitate interactive collaboration among students, creating a more engaging learning environment. This presentation will explore the benefits of using Miro, a collaborative

virtual whiteboard, in college-level biology courses. With its versatile interface and vast canvas, Miro supports interactive learning, enabling students to visualize complex biological processes, collaborate and engage in problem-solving activities, all done in real time. Through a practical demonstration I will share my experience of using Miro in a genetics course, showing the exercises I designed to deepen the understanding of independent assortment. Additionally, I will present survey results reflecting my students' perceptions of these activities. Moving forward, I aim to explore the impact of dynamic and visually enriched activities in Miro on the comprehension of intricate biological concepts.

Natural transformation of antibiotic resistance as a microbiology lab experiment

James F. Graves, University of Detroit Mercy

Transformation is a mechanism of gene transfer where plain donor DNA is taken up and used by a recipient cell. Artificial transformation of Escherichia coli bacteria is commonly performed in laboratory courses using cells treated with calcium chloride in the cold. Natural transformation is a life process and is observed in the gram-negative coccus known as Moraxella catarrhalis. This bacterium resides in the upper respiratory tract and can be associated with bronchitis, bronchopneumonia, sinusitis and otitis. The purpose of this work was to develop a natural transformation exercise that could be considered for use in a microbiology lab course for students interested in healthcare careers. It would assist in student learning about development and transfer of antibiotic resistance. Rifampicin is an antibiotic that reduces synthesis of RNA by interfering with DNA dependent RNA polymerase in bacteria. A spontaneous rifampicin resistant mutant of M. catarrhalis to be used as a donor was selected by incubating samples of antibiotic sensitive cells spread on brain heart infusion (BHI) agar containing rifampicin for a few days. Nucleic acid was isolated from cells of the mutant by a procedure using lysozyme, sodium dodecyl sulfate (SDS), protease, phenol, chloroform-isoamyl alcohol and ethanol precipitation. Cells for transformation (competent cells) were prepared by suspending a mass of freshly grown rifampicin sensitive cells in BHI containing magnesium chloride. Samples of cells incubated with nucleic acid, cells alone and nucleic acid alone were spread on respective agar plates, incubated for five hours and overlaid with melted agar containing rifampicin. After incubation, colonies were evident on plates containing cells that had been incubated with nucleic acid. Mutants and transformants were evaluated by staining, production of oxidase, fermentation reactions and testing of antibiotic resistance. An exercise on natural transformation in M. catarrhalis might offer some benefits in laboratory course education.

Is Tori seeing red? An activity to reveal the complexities hiding behind human pedigree charts.

Ahmad Mohammed Kamal, Si-ah Choi, Aoniya Colynn, Ashleigh Wood, Pamela Kalas
University of British Columbia

Pedigrees are common features of introductory genetics curricula, providing great opportunities for students to develop critical and analytical skills. However, they are usually presented with phenotypes entirely determined by genotypes, which does not reflect current-day understanding of genetics and can inadvertently reinforce genetic essentialist beliefs.

For example, red-green color vision deficiencies (CVDs), often used as examples to illustrate X-linked recessive inheritance patterns, are typically presented in a dichotomous way: either a family member has a red-green CVD, or they don't. However, red-green colour vision exists on a spectrum and is influenced by multiple factors. The diagnostic tools and "threshold values" used to diagnose red-green CVDs also vary across contexts and don't always hold biological significance.

To expose students to the nuances and intricacies hidden behind the black and white symbols used in pedigrees, we developed an in-class activity on protanopia (a form of red-green CVD) where the inheritance pattern does not fit an X-linked recessive model. Using information entirely inspired from published literature, students contend with real-life nuances such as the natural variation in red-green colour vision that exists across people, the validity and reliability of colour vision test results, and the difficulties associated with reducing a quantitative measure (level of red-green colour vision) into a dichotomous representation ("affected" vs. "unaffected").

We will present the activity, highlight some of the students' responses from its implementation with two different cohorts, and invite colleagues far and wide to provide us with feedback – and maybe try out the activity in their own classes!

40-minute Presentations

In-person Presentations

Friday, October 18th, 2024

A Walk in the Park: A Botanical Field Research Project for Biology Students.

Luciana Caporaletti, Penn State University

Beech trees are declining in number throughout the U.S. A contributing factor is Beech Tree Leaf Disease. Research has identified the pathogen, but continuous research on the spread and transmission of this disease is ongoing. My students and I conducted a survey of Beech trees that were symptomatic at two different Pennsylvania state parks; Promised Land State Park, and Francis Slocum. Our surveys were descriptive, however, there are multiple hypotheses that could be tested using this kind of research. This presentation will describe the trees, the disease, the methodology of our research, and our results. Suggestions for similar experiments will follow.

Exploring Math in Biology: Perspectives of Two-Year College Educators

Kristine Squillace Stenlund

University of Minnesota and Dakota County Technical College

Mathematics competency in the context of biology is important for STEM careers. Two-year colleges provide foundational science education to a large proportion of these developing professionals in the US and is an important arena for education research. This study employs a convenience survey was designed to explore 2-year college biology instructor perceptions and use of mathematics in the biology context addressing the following research questions:

(1) Do 2-year college instructors report using mathematics in biology classroom instruction?

(2)What are 2-year college instructor's perceptions of mathematics associated with biology classes?

(3) What are 2-year college instructor's perceptions of student understanding of mathematics associated with biology classes?

(4) What objectives do 2-year college instructors have for mathematics in biology classes?

(5) What activities do 2- year college instructors report when teaching mathematics in biology classes?

Respondents were asked a series of 6-point Likert questions surrounding efficacy, algorithmics, mathematical sensemaking, biological sensemaking, fixed mindset, and perceived difficulty in mathematical concepts pertaining to biological phenomena (RQ1-3). Mean values and standard deviations were calculated for each factor and statistically analysis through a paired t test and Cohen's d size effect. Questions 4 & 5 were addressed via ranking questions of learning objectives and classroom activities. Responses indicate instructors are confident with their mathematical abilities but do not feel the same confidence in their students. Data reveals that instructors do use mathematics in their biology classrooms and value the connection between content in their class learning objectives. Instructors report listing mathematical connections to biological phenomena as top learning objectives in their introductory biology classes. However, instructors also indicate they do not use classroom activities in line with these learning objectives. Overall, this study suggests 2-year college instructors may benefit from workshop opportunities focused on ways to allow students to build connections between mathematics and biology.

Saturday, October 19th, 2024

Morning Brew: An Intimate Discussion On Preparing For A Teaching Career Post-PhD

Facilitated By:

Nouran Amin, Assistant Teaching Professor of Biology at Ball State University,

JT Cornelius, a doctoral candidate at Indiana University School of Medicine

Deciding to pursue a teaching career after completing your PhD can be both exciting and challenging. Join us for a delightful breakfast session tailored specifically for graduate students considering a teaching career.

Whether you're just beginning to explore teaching opportunities or are actively preparing to apply, this session will serve as a safe space to connect with others who share your career aspirations and provide valuable insights into preparing yourself to transition from graduate school to a teaching role.

During the interactive session, we will offer practical guidance on navigating the academic job market, crafting compelling application materials, and preparing for interviews. The format will also include a Q&A segment where participants can ask questions and engage in meaningful dialogue about the realities of teaching careers in higher education.

Preparing Graduate Students for Teaching Through a Certificate in University Teaching Program
George Todd, University of Missouri-St. Louis
Many graduate students with career goals of teaching in higher education obtain teaching assistantships to gain teaching experience. However, many of these assistantships lack a structured foundation of teaching tools, pedagogies and observational feedback. The Certificate in University Teaching (CUT) program at the University of Missouri-St. Louis is designed to provide graduate students interested in teaching with tools, professional development and practice in the classroom. Here, I provide an overview of the CUT program, a personal reflection as a participant in the program, and space for discussions about how our respective institutions use or lack such programs for graduate students.

Virtual 40-minute Presentations

An Intriguing Intersectionality: The Role of Medical Experiences and First-Generation Status
Brittney N. Wyatt, Porter Bischoff, Clayton Rawson, Kody Garrett, Joshua Premo
It has been estimated ~1 in 2 individuals in the US suffer from a consistent medical condition (Raghupathi & Raghupathi, 2018). Yet limited research in science education has explored how students' medical experiences may impact their pursuits of science. The current study examined the relationships between student (n = 366) medical experiences and indicators of science success (e.g. science motivation, immersion, and integration) for students taking biology classes at a public teaching-focused university. Results show students with a medical experience had significantly higher values, yet small magnitude, in indicators of success. Subsequent analysis showed the quality of medical experience was correlated with many indicators of success; particularly if the experience resulted in more engagement with science. Examinations of intersectionality between medical experiences and underrepresented student status highlighted first-generation students (FGS) with medical experiences to have the highest averages in science motivation, immersion, and integration. This is surprising given FGS almost always have lower values than their peers in prior studies. When examining the data for a potential mechanism of action, stronger associations between the quality of FGS medical experience and their indicators of success were found. Thus, while medical experiences may promote more success for all students in science, it may have a uniquely important role for FGS. Implications of these results for student success in science will be discussed.

Difficult Conversations, Real Biology: Student essentialist beliefs of race and biological sex
Josh Premo, Saskia Paepke-Chile, T. Heath Ogden, Jessica Cusick, & Brittney Wyatt, Utah Valley University
Educators must support students' willingness to be inclusive in their beliefs as this has been found to be critical for creativity and productivity in their future career. Endorsing essentialist ideas (e.g. all males are the same) can sometimes combat inclusive ideas (e.g. biological sex is a spectrum). The current study examined students' (n = 876) essentialist beliefs of race and biological sex to answer the following research questions: 1) What essentialist views regarding racial genetics and biological sex do students begin and end the semester with? 2) What factors predict students' final endorsement of non-essentialist ideas? 3) If students recognize their essentialist ideas are changing, why do they believe these have changed? Results showed that students were 2.5 times more likely to embrace essentialist ideas of biological sex than race. Factors that predicted non-essentialism in both areas included: 1) engagement in active learning, 2) less time listening to lectures, 3) liberalism, and 4) instructor addressing the topic in class. A unique factor predicting non-essentialist ideas of race was student connection to their instructor. At the end of the semester 38% of students felt that they were more accepting of non-essentialist ideas of race and 29% were more accepting of biological sex as a spectrum. In both cases, most students felt that evidence from class was the biggest contributor to the change, while having previously misunderstandings was the smallest. How these results can inform instructional practices seeking to increase student inclusivity in beliefs will be discussed.

Poster Presentations

In- Person Presentation

Effects of student demographics on self-identity as a scientist in course-based research modules

Christopher Yahnke, University of Wisconsin - Stevens Point

Course-based Undergraduate Research Experiences (CUREs) are an ideal teaching method to share the benefits of authentic research experiences to a larger, more diverse population of students. We created a national network of field-based, mammalogy focused CURE modules investigating the behavioral ecology of squirrels, called Squirrel-Net. Previously, we found that Squirrel-Net improves student self-identity as scientists. Here, we describe the demographic parameters of Squirrel-Net students and their impact on students' likelihood to self-identify as scientists. Students from almost 60 institutions spanning 90 courses responded to surveys before and after participating in a Squirrel-Net CURE between 2019-2022. Student demographics included gender, ethnicity, identification as Hispanic, and first-generation status. Student respondents for pre- and post-CURE surveys (N = 2382) were very demographically similar, with students most often identifying as female, white, non-Hispanic, and non-first-generation. We analyzed demographic parameters as predictors of self-identity as scientists with paired response data (N=466) using GLMs in R. Females and non-first-generation students were more likely to identify as scientists after participating in Squirrel-Net. Females were also more likely to change their response in a positive direction than males, and first-generation students were less likely to change their response than non-first-generation students. Our analyses provide a demographic snapshot of Squirrel-Net students, highlight the importance of expanding and diversifying the network, and confirm the benefits and pedagogical effectiveness of Squirrel-Net for undergraduate students.

Leveraging the Benefits of the Digital Era: Identifying the value of Non-Traditional Learning Methods

Brooke Greiner, Medical College of Wisconsin

The most optimal learning style varies between individuals. Living in the Digital Era, we have the ability to present educational information in many different forms. Utilization of more non-traditional learning methods, such as YouTube or Podcasts, as a form of scientific education benefits both classroom learning and the dissemination of scientific information to the general public. However, presenting scientific information in non-traditional formats is not common practice. We distributed a survey to the general adult population which aimed to assess the value of non-traditional learning methods for learning topics related to science, technology, engineering, and math both in and outside the classroom. We evaluated the general desire for more non-traditional learning methods and identified what forms of non-traditional learning methods may be most useful for learning in and outside of the classroom. We identified similarities and differences in responses between groups based on age, gender, level of education, and involvement in a STEM based career. Understanding the desire for non-traditional learning methods would highlight the need for educators and researchers to work together to diversify the scientific content that currently exists. By identifying preferred methods of non-traditional learning across different groups within the population, there is potential for platform and audience specific training for educators and researchers which will minimize time being spent learning less utilized platforms.

Incorporating Conversations on Diversity, Equity, and Inclusion into the Undergraduate Research Experience

Ellie Marino & Stacia Peiffer, Marquette University, Milwaukee, WI

Though diversity, equity, and inclusion (DEI) has garnered significant attention in the STEM community over the last decade, formal guidance and programming to facilitate DEI conversations at the undergraduate level remains limited. To incorporate intentional communication about diversity, equity, and inclusion, a small but impactful change was made to the traditional Summer Research Program (SRP) curriculum in the Biological Sciences Department at Marquette University. While previous curricula have featured "journal club" meetings centered around a scientific manuscript relevant to a specific biological field, the program instead prompted students to present a paper and facilitate a discussion regarding a DEI issue in science. Throughout the nine-week program, students facilitated three journal clubs, where paper topics included inclusive scientific language, the sex and gender gap in scientific publications, and methods of supporting inclusive and accessible science communication. Student feedback on this

journal club style was overwhelmingly positive, and class discussions were both comprehensive and productive. Though the Summer Research Program is primarily designed to facilitate undergraduate research, the journal clubs were a simple and effective method of integrating intentional conversations about the intersection of DEI and science. Importantly, this activity demonstrates that diversity, equity, and inclusion can be seamlessly incorporated into the undergraduate research experience and is a critical educational opportunity in building undergraduate scientists.

Enhancing Belonging for Underrepresented Students through Student-Designed Learning Field Experiences
Brian R. Shmaefsky, Lone Star College – Kingwood
This study explores the effectiveness of teaching the scientific method through student-driven observational studies of local wildlife behavior in an introductory environmental science course for college freshmen. By integrating place-based instruction with core field science principles, students gained hands-on experience in hypothesis formation, data collection, and analysis, while also developing a deeper connection to their local ecosystem. This project uses urban squirrels as a model fro observing wildlife behaviors such as feeding, movement, and social interactions in nearby natural areas. Through structured assignments and guided inquiry, students learn to apply the scientific method in a real-world context, fostering critical thinking and environmental awareness. Preliminary results suggest that this approach enhances engagement, improves understanding of scientific processes, and encourages active learning. Additionally, the proximity of the study site allows for continuous observation and data gathering, offering a dynamic learning environment that bridges classroom theory with practical experience in ecology and environmental science.

Virtual Poster presentations

Enhancing Student Engagement in Biology Courses Using a Real-World Case Study
Dr. Dan Kiernan and Dr. Pearl Fernandes
Division of Science, Mathematics, & Engineering, University of South Carolina, Sumter - A Palmetto College Campus
In recent years there has been an emphasis on a case study approach to teaching science courses. This pedagogical method has shown great promise in enhancing the understanding of concepts in the science classroom. Case studies lay the groundwork for inquiry-based units that help students enhance teamwork, deductive reasoning and provide training to improve their critical thinking.
Students in a Biology course for non-majors were provided a case study of a male African American high school senior football player who collapsed during practice and was observed to be not breathing and had no pulse. There was no prior history of medical problems. Students were also provided with the results of the blood test. Students were divided into four groups and were asked to:
1) Research, formulate and find a cause for the athlete's collapse.
2) Research the effects of genetic disorders and their interactions in cause of the collapse.
3) The effect of genetic disorders on organs and organ systems.
4) The effects at the cellular level.
The student groups presented their results and our observations and findings indicated that student learning was enhanced through this relevant case study and helped them make connections between concepts and real-world problems. A student quote from the course regarding the case study, "this should be a regular activity in classrooms. Very entertaining and educational."

Collaborative Learning Environments: The dynamics that matter.
Connor Mackintosh, Zaira V. Meza-Leon, Brittney N. Wyatt, & Joshua Premo
Utah Valley University
Common active learning strategies include the use of group work with the assumption that group work will increase student learning. However, there is inconsistency in how much students will learn in their group. Some may learn more than others due to a variety of factors such as: interactions, contributions, and willingness to work with each other in a group (Premo, Wyatt, et al., 2022). The current study expands on research in this area by looking at how different dynamics predict both immediate (assessed at the end of each activity) and long-term (exams and end of

semester) achievement by answering the following questions: 1) What group dynamics predict an increase in learning (immediate and long-term)? 2) What factors drive students to engage in beneficial group dynamics? We collected peer ratings of group dynamics from over 200 students enrolled in undergraduate biology courses. The results indicate significant correlations between group dynamics and both immediate and long-term learning outcomes, (except for final exam scores). Students achieved higher end of activity scores when group dynamics included more content contributions, general interactions, monitoring of on-task behavior, motivation to produce quality work, and when members were perceived as having higher knowledge, skills, and abilities ($p < 0.05$). Additionally, students attained higher end-of-semester scores when their group members expressed a desire to work with them, liked them, and enjoyed spending time with them in class ($p < 0.05$). The study also reveals demographic factors influencing group dynamics. For example, women were rated higher than men in social connection, contribution, interaction, and keeping the team on track but not in knowledge dynamics. Furthermore, students were more connected to group members who identified as as having higher socioeconomic status growing up. The dynamics of contributions, interactions, keeping the team on track, and social connection followed a similar pattern. These findings underscore the importance of student behavior within groups, the group's social environment, and peer support in optimizing undergraduate science learning. They also highlight how gender and socioeconomic status can impact student engagement in groups.

Leveraging Generative AI in Computational Biology Education

Camellia Moses Okpodu, University of Wyoming

Generative Artificial Intelligence (AI) tools have emerged as powerful aids across scientific domains, including Computational Biology. In this abstract, I share my experiences of integrating these tools into teaching a computational biology course—a field that increasingly intersects with computational science, particularly within the biological sciences. Computational biology bridges molecular biology and computers, enabling data-driven insights into biological systems. Historically, the discipline relied heavily on handcrafted algorithms for protein, gene, and nucleic acid analysis. The advent of Generative AI, exemplified by models like GPT-3, has transformed how we approach computational biology education. Generative AI assists educators in refining course materials, creating engaging content, and improving scientific communication. Finding specific code snippets for teaching and learning, such as using R-Studio, becomes more efficient. AI-generated exercises challenge students and promote critical thinking. Additionally, Generative AI can create custom cartoon images for presentations, enhancing visual communication. While embracing AI, it's crucial to discuss the ethical, legal, and social implications with students. Encourage responsible use and awareness of biases inherent in AI-generated content. Generative AI empowers educators and learners in computational biology. By leveraging these tools, we enhance teaching effectiveness, foster creativity, and prepare students for an AI-augmented scientific landscape.

Exploring Study Strategies in Introductory Biology Courses

Zaira V. Meza-Leon, Eden Backman, Molly Niswender, Jeremy L. Hsu, Joshua Premo, & Brittney N. Wyatt , Utah Valley University

Effective study strategies are crucial for student success in STEM disciplines, yet there is limited research on the factors that influence the adoption and adaptation of these strategies throughout a semester. This study explores two key questions: 1) What factors drive changes in study strategies among students in introductory biology courses? 2) How do these study strategies evolve over time? To answer these questions, we administered a study strategies survey at the beginning and end of the semester in introductory biology courses at a private comprehensive university in California and a public open-enrollment university in Utah. Our findings indicate that students adopt and modify their study strategies during the semester, with instructors serving as the primary source of new strategies. Also, strategies involving trial and error, as well as vicarious and mastery experiences, show significant changes over the semester, while textbook reading declines by nearly 20% by the end of the semester. There was also significant variability in study strategies between institutions. These results suggest that instructor guidance plays a crucial role in fostering critical thinking and encouraging the adoption of more effective study practices. Overall, students actively refine their study strategies throughout the semester, but this may vary significantly. What results indicate about student's studying habits and how instructors might optimize studying in service of greater learning will be discussed.

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