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MBoC

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8th Special Issue on Quantitative Cell Biology

Image by Janet Iwasa

Submit by: Nov. 1 • **Release Date:** Spring 2022 • **Issue Co-Editors:** Diane Lidke, Jennifer Lippincott-Schwartz, and Alex Mogilner

About the issue:

ASCB and *Molecular Biology of the Cell* (*MBoC*) recognize the profound influence that concepts and technologies from the physical and computational sciences are having on cell biology. This issue will build on the great success of the seven issues published since 2014 and will again provide an opportunity for researchers whose work crosses disciplines to reach a wide audience.

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introduction

Education and Inclusivity

by w. mark leader, editor

This issue of the *Newsletter* focuses on Education, but another theme runs through much of it: Inclusivity.

As schools attempt to return to in-person instruction, we should consider whether any of the innovations from online instruction are worth keeping. In her Feature article, Kelly Hogan describes the changes students would like to see made to in-person instruction and notes that many of these changes will help foster a more inclusive educational environment (p. 8).

Changes that promote inclusivity can help all students, not just those from underrepresented or marginalized groups. That is the premise of universal design for learning, which Alison Dell discusses in this issue's Office Hours with the Education Committee column (p. 28).

How can our education system better accommodate persons with disabilities? See the essay by Alexis S. Mobley on p. 30: "Disability is Diversity: How to Increase Accessibility in Science." In addition, Suzanne Craig describes the challenges facing hard of hearing students (p. 21).

Read about the many ways that ASCB supports education in the President's Column on p. 4. And how can instructors increase students' metacognition, or awareness of how they learn, to enable them to learn more effectively? See p. 16.

And there's more, including Elva Diaz' essay on transformative justice in education (p. 24) and Labby's advice on returning to the lab safely (p. 33).

I hope you find some food for thought here as we approach the beginning of fall classes.

The *Newsletter* Welcomes Letters to the Editor

Have thoughts you'd like to share with your colleagues? We'd be happy to consider your Letter to the Editor for publication in the *ASCB Newsletter*. Write to the Editor at mleader@ascb.org.

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president's column

The Future of Cell Biology Depends on Good Teachers

By A. Malcolm Campbell and Ruth Lehmann

The Future of Cell Biology Is Germinating in Classrooms Today

What paves the path to a passion for science? For some, it may have been an inherent curiosity about the living world. For the authors of this column, and probably many of our readers, the switch was firmly turned on by an inspirational science teacher. These teachers sparked our interest and amplified our inherent love of science. In this column we want to address how ASCB can and does support science education. Teaching can include hosting middle or high schoolers in the lab or instructing undergraduates, graduate students, or postdocs in the classroom and laboratory setting.

If we want to attract more bright minds to careers in biomedicine, we need to consider the teaching and learning landscape. The COVID-19 pandemic upended all levels of education. Very few faculty were prepared for the sudden move to remote instruction. Anyone who taught classes during this pandemic experienced the exhaustion of online instruction, and how difficult it can be to connect with students via Zoom. Meanwhile two- and four-year institutions are responding to increased financial challenges by gambling with the educational outcomes of potential scientists. Common responses to reduced budgets include increasing class sizes and minimizing laboratory instruction. Larger class sizes can result in higher dropout rates and a reduction in on-time degree completion.[1] In an increasingly difficult teaching environment, how can ASCB and the community of cell biologists help science teachers inspire the next generation?

How can we expect to recruit new biologists if they are discouraged and marginalized? For many students, learning away from campus during the last 16 months amplified inequities. Students faced numerous challenges at home that hindered their science learning: slow or no internet access; no quiet place to work; family requests for childcare or other household duties; and financial hardships due to unemployed parents, which required students to seek employment. Student experiences in the classroom influences enrollment trends. The National Student Clearinghouse Research Center reported that undergraduate enrollment in 2020 fell about 4% at four-year institutions in the United States, and over 9% at community colleges. Meanwhile, the concerted response to the pandemic from scientists at all levels and across university laboratories, biotech, and pharma clearly demonstrated the transformative role science can play for society and brought hope during the pandemic crisis. Indeed, this promise may be one of the reasons why graduate student enrollment increased by about 4%.[2] How can we tap the rewards of science and bring excitement to the classroom?

Promoting Inspired Solutions

ASCB is a leading scientific organization and a global leader in science education. About 30% of ASCB members characterize themselves as educators. This means we have a wealth of educational expertise in our community. In 2020, the fastest areas of growth in ASCB membership were undergraduates (+146%), graduate students (+122%), and postdoctoral fellows (+62%). Since all ASCB members

were students before they were scientists, this growth in younger ASCB members presents a unique opportunity to shape the future of science. In part due to the pandemic, many undergraduates have expressed more interest in biomedical sciences. At the University of Bath in the United Kingdom, 10–50% more students are choosing majors in biomedical sciences.[3]

Many of you may be thinking, "I can barely keep up, how can I find time to improve my teaching?" However, if you see teaching as a long-term investment in the recruitment of graduate students and postdocs to research and education, it becomes evident why making time for better teaching is in our self-interest. Drawing diverse students to research and mentoring them will strengthen the scientific enterprise at large. Multiple studies have shown that diverse research teams are more successful.[4] Indeed, ASCB Council member Andrew Campbell reported on Brown University's successful efforts to increase diversity of its graduate programs.[5] ASCB member David Asai and Cynthia Bauerle described how increasing diversity in science training programs will increase our talent pool and thus produce better science.[6]

How can instructional methods and inclusive classroom settings help retain diverse students? Many ASCB members contribute to open-access resources that can help improve teaching practices. ASCB publishes *CBE—Life Sciences Education* (*LSE*; www.lifescied.org), a top biology education journal. ASCB is a founding partner with CourseSource (www.coursesource.org), which provides curbside pickup curricula ready to adopt and adapt with minimal effort. Some suggestions to improve teaching are simple to implement and won't take extra time. For example, Elisabeth Schussler and colleagues reported in *LSE* how faculty classroom behavior affects students' sense of feeling supported, which affects their learning.[7] *LSE* Co-Editor-in-Chief Kimberly Tanner has shown the importance of encouraging student talking in class[8] and the impact of "non-content instructor talk,"[9, 10] the side comments teachers make in the classroom. For by-the-numbers instructional advice, Tanner published 21 ways to promote engagement and equity in the classroom.[11] Deborah Allen and Tanner produced a list of strategies to increase student engagement in large-enrollment courses.[12] Mays Imad described ways instructors can help students learn during times of trauma such as a pandemic or stressful classroom conditions.[13] Bryan Dewsbury and Cynthia Brame collated an online repository of resources to help anyone incorporate inclusive teaching in their courses (https://lse.ascb.org/evidence-based-teaching-guides/inclusive-teaching).[14] iBiology, founded by ASCB member and former ASCB president Ron Vale, has produced highly reliable information including a series of short videos that introduce the problems with traditional instruction and provide ready-to-use solutions. These "Scientific Teaching Series" (www.ibiology.org/playlists/scientific-teaching-series) videos feature many ASCB members who have already enhanced their own instruction and want to help you do the same.

Other ASCB members have addressed common problems we all face as educators. For example, Erin Dolan's research team described the consequences of negative mentoring for doctoral students.[15, 16] Erin Shortlidge and colleagues analyzed course-based undergraduate research experiences (CUREs) and how experimental failures in teaching labs provide a more authentic research experience.[17] Sara Brownell leads a team who provides pointers on overcoming students' religion-based objections to learning evolution in our courses.[18] ASCB has partnered with CourseSource to publish many peer-reviewed, open access cell biology course modules (www.coursesource.org/courses/cell-biology). With all these diverse approaches to improve instruction, ASCB wants to help educators achieve their aspirations with manageable effort and maximized outcome.

Learning to Train Future Scientists

Just because you have trained in academia for many years does not mean you will be an expert teacher. Indeed, many institutions fail miserably in teaching

president's column

faculty how to teach and underestimate the time and effort new teachers must dedicate to learning the trade. This is especially true if new faculty had little previous teaching experience, or were trained outside the U.S. system. Just like we wouldn't attempt a new line of research without first reading what others have done in the field, relying on what we experienced as a student, or what "feels right," is unlikely to be an effective approach. Instead, we can learn from expert fellow ASCB members and adopt their evidence-based teaching practices (www.ascb.org/career-development/teaching). Depending on the activity, treat your first efforts as a pilot study and collect assessment data to inform your revisions.[19] Everyone should expect some ups and downs with any new approach to teaching and see progress as a trendline with positive slope but not the best r^2 value.

The future of ASCB, and all scientific fields, is in the hands of today's teachers educating tomorrow's scientific leaders. What kind of experience do we want our next generation to have in their science courses? It pays off to take the time to learn from ASCB members who self-identify as educators and who publish in *LSE* and other journals. The ASCB virtual meeting in December (www.ascb.org/cellbio2021) will provide a perfect opportunity to connect with fellow ASCB members who are master teachers. Just like you reach out to experts for the latest research method, reach out to a teacher you admire and get advice. They would be happy to support your efforts in education. The power of ASCB is our community that is willing to share across specialized areas of expertise.

ASCB members volunteer their time to serve on committees to help all members, especially younger ones (www.ascb.org/career-development). For example, the Minorities Affairs Committee (MAC) runs workshops to help early career scientists write grants and transition into full-time positions (in and out of academia). Students and postdocs can attend ASCB's annual Biotech Course (even during a pandemic). ASCB will match any member with a mentor who can give career advice or help with teaching practices (https://palm.ascb.org). The annual meeting offers many opportunities to learn from the best of the best. The MAC runs workshops during the annual meeting to help undergraduates considering graduate school, as well as senior graduate students, postdocs, and junior faculty members. Newly elected ASCB Council member Veronica Segarra and her colleagues quantified how MAC programs have helped ASCB members professionally, and increased ethnic diversity in cell biology.[20] These workshops are open to ALL ASCB members.

ASCB supports its members who self-organize a plethora of programs. The Committee for Postdocs and Students (COMPASS) is run by and for graduate students and postdocs. This energetic committee leads over a dozen sessions during the annual meeting. The LGBTQ+ Committee offers support and mentoring for those who self-identify as members of that community, and their allies. The leaders of ASCB recognize how ASCB helped launch their own careers and they are eager to pass on the tradition to younger members. For this reason, ASCB is working hard to keep membership dues low for members who have most of their careers ahead of them.

Your elected leaders of ASCB know the value of good educators and thank all teachers for their hard work, especially during the pandemic. None of us would be a scientist if we had bad teachers thwarting our professional ambitions. So, honor your former teachers by inspiring and recruiting the next generation. Simply put, ASCB values education as the foundation of good science.

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What Students Want from Remote Learning

By Kelly Hogan

Many higher education instructors are returning to in-person teaching this fall. Educators and students alike do not necessarily want everything to be exactly like fall 2019. We have an opportunity to reflect before we begin—perhaps on ways to bring more inclusive practices to our teaching. I collected data from over 700 students on my campus and share with you a few tangible ideas that students expressed they wanted to see continued with the return to in-person teaching. I was thrilled to see that many of these ideas align with inclusive teaching strategies. Students would like to see a continuation of:

Weekly emails from instructors that include required tasks, encouragements, and personal updates/reflections

"Weekly emails made clear what we had to accomplish that week while also encouraging us."

With so many remote and asynchronous courses thrust upon them in the last year, many students were feeling overwhelmed and disconnected. In response, some instructors implemented weekly emails to keep students on-task and motivated. This kind of structure is inclusive because it helps more students stay organized without harm to those that do not need reminders.[1] But we all appreciate reminders, right?

With in-person teaching, many educators use the beginning or end of class to make announcements about upcoming assignments. Even if all students are present, some will miss the oral messaging and will appreciate having the weekly run-down in a written form. Having both oral messaging and a weekly email message aligns with Universal Design in Learning, a framework for inclusion that provides diverse learners multiple ways to access materials.[2]

A "live chat" feature with in-person classes

"I enjoy the chat feature [in Zoom] and think it would be nice to have some kind of in-person version."

I had always done a great deal of polling of my students with their phones or laptops in my in-person classes, but the backchannel nature of live chat in

Zoom opened up new possibilities for communication in my course with hundreds of students. Some students who don't feel comfortable speaking aloud in class are eager to participate in written form, and I'm now left wondering how to implement this always-open back channel in my classroom where students can answer each other's questions and make free-flowing comments about the material being discussed. Some options to explore are Google Docs, GroupMe, Polleverywhere's pinned activities, Twitter, and Zoom chat. More options are discussed in this guide from the University of Guelph: https://bit.ly/3hOuLHe.

Virtual office hours and review sessions

"I think Zoom should be continued to be used for some activities. It helps save time for students and makes showing up to office hours more possible for me, as I can easily access Zoom from wherever I am."

A summary of students' quotes demonstrates the value of virtual office hours and review sessions. Virtual sessions are more convenient, safer (without needing to walk in the dark for late sessions), don't require office space/classrooms, and open up more times of the day. It is clear that some students still want in-person options, so we need to find the right balance with our students.

Asynchronous days

"I hope professors still include asynchronous days, every once in a while, just to give students a reprieve during the semester."

While many of us are excited to be together in classrooms, students hope to see some asynchronous learning activities that they became familiar with during the pandemic. These may or may not replace an in-person session. What parts of our courses would benefit from asynchronous learning? Content that is lecture-based is useful in a prerecorded video or reading so students can go at their own pace. Similarly, some kinds of problem-solving and individual work are more inclusive in a self-paced format before collaboration can be successful. For many educators, the pandemic has made even clearer the value of using

class time for discussions, problem-solving, and other collaborative activities.

Flexibility with assignment due dates

"I hope instructors remain flexible. I hope they continue to understand that even if there is not a pandemic, students are dealing with things behind the scenes that they don't see."

Many comments from students suggested a compassion from their instructors they had never known before. Students appreciated a focus on mental wellness. How can we continue to be flexible yet provide the structure needed for learning? To provide equitable flexibility, consider setting deadlines with grace periods for all students—not just the ones who ask. Many students are intimidated about asking for an extension, even when they are really suffering. There is no one-size-fits-all advice here. You'll know best how you can implement grace periods for students in your class with the number of students you have. Surveying your students early and throughout the semester can inform you about what helps the most students.

Recorded classes available for review later

"One thing I liked about remote instruction is that lectures are recorded often times and I can go back to review the material as many times as I want."

- A multilingual learner wants to re-watch an explanation.
- A student with chronic illness missed part of class due to a doctor's visit running late and wants to see what they missed.
- A student with a concussion is advised to take a week off from all their classes and wants to watch classes later—not only rely on a classmate's notes.

In all of these situations and more, recording the in-person component of class (often called lecture-capture) is an inclusive teaching practice. Classroom technology to record audio and video may already exist in many instructors' classrooms, but most of us already have the individual tools and experience with apps like Zoom. If you plan to record in-person classes, it is best to begin by learning what is available on your own campus.

Educational research highlights that lecture-capture can be a contested space between students and educators. Instructors tend to worry about negative impacts around attendance, learning, and pedagogical choice.[3] Yet, the context of each classroom, such as class size, available technology, and pedagogical strategies used, matter in these outcomes. As scientists, we can appreciate nuances within complex issues. This fall, keep an open mind and listen to why a diverse set of students want recordings. Then, determine the best way to help all students thrive whether that be through classroom recordings, prerecorded videos, or other resources.

Open note exams

"I've gotten used to a lot of open-note exams (allowed by the professor, of course), and I hope they stay that way, since exams are becoming more application based rather than strict memorization, which makes me feel as though I am learning more. I am concerned about my performance if we were to go back to memorization-based learning."

Prior to the pandemic, open-note testing was not common in a lot of biology courses. Many instructors implemented this strategy as a necessity with emergency remote teaching. It is useful to consider the advantages and disadvantages of adopting this assessment strategy long term. The research about open-note exams in biological sciences is not clear-cut, but one point of consensus is that students are more at ease having their notes. Reducing anxiety during exams is a definite benefit. Another benefit is the emphasis on higher-order thinking over recall, such as interpreting data vs. defining terms. Teaching students to think critically is seen as essential to transform biology education, especially in introductory courses.[4] Educational research shows that short-term learning and performance may improve, but one disadvantage may be decreases in long-term retention. Because many students prepare

differently when they know an exam is open vs. closed notes, it is probably advisable to help students learn how to best prepare and to stay consistent within a course.[5]

As we head into the fall, let's not only consider what we have felt and learned through this pandemic as educators. We can listen to the voices of students. I encourage you to collect data from your own students. Implementing quick surveys and assessments early in the fall semester can help you gauge student emotions, gather ideas for teaching strategies, and estimate knowledge and skills. Students can be valuable partners in the teaching and learning process.

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ASCB's 2021 Virtual Biotech Course Gets Rave Reviews

By Thea Clarke

Yes, it would have been better in person, but presenting the ASCB Biotech Course virtually (again) definitely made it possible for more people to attend. This year ASCB received 121 applications for 55 slots in the course. Participants came from 46 different institutions and seven countries. Those who were selected to attend from June 7–11 were exposed to a comprehensive overview of information highly relevant to finding jobs outside academia.

Organized with Keck Graduate Institute and Manning School of Business, University of Massachusetts, Lowell, the course covered: 1) case studies about how science gets commercialized and networking strategies; 2) a career panel and breakouts with course alumni who have obtained jobs in industry; 3) a team project culminating in a five-minute pitch to invest in a hypothetical regenerative medicine advance; 4) information about the different jobs available, how to dissect a job posting and tailor a resume to the posting, and interview tips; and 5) indispensable advice from several keynote speakers. As one attendee noted, "There's no way I would have had access to this information, even with all of the Internet resources and talking to my friends in industry." Another participant stated, "This course has given me a lot more confidence as I try to navigate the biotech world and contemplate careers."

Generous support from Biogen and the Center for Advancing Point of Care Technologies made it possible to offer reasonable fees for all attendees. At this time, it appears we will offer next year's course virtually again.

Want to Get More Involved with ASCB? Join a Committee!

Now's your chance to apply to join one of ASCB's many committees! ASCB has numerous standing committees to meet members' interests. Get to know others with those same interests, boost your CV, and help your Society move forward.

This volunteer opportunity is open from August 1 to October 15, 2021. All you need to do is submit a CV and a statement of interest. You will be asked to describe your work in and commitment to diversity, equity, and inclusion (in a maximum of 200 words).

Most committees take on somewhere between three and five new people each year as Associate members for one year, before considering those Associates for full three-year terms.

Find out more about the following committees and apply at ascb.org/committees.

- Ambassadors
- Committee for Postdocs and Students
- Council
- Education
- Finance & Audit
- International Affairs
- LGBTQ+
- Membership
- Minorities Affairs
- Nominating
- Program
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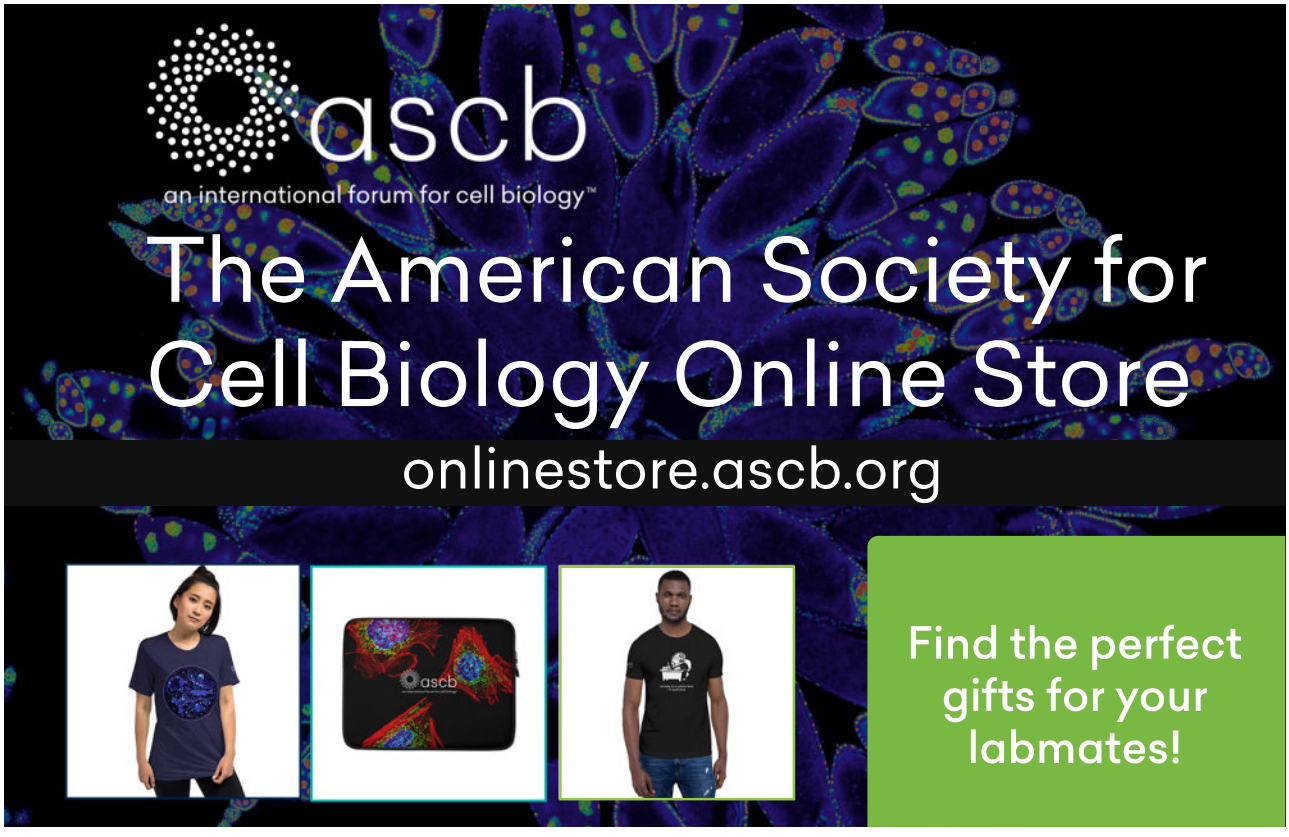
- Public Policy
- Women in Cell Biology



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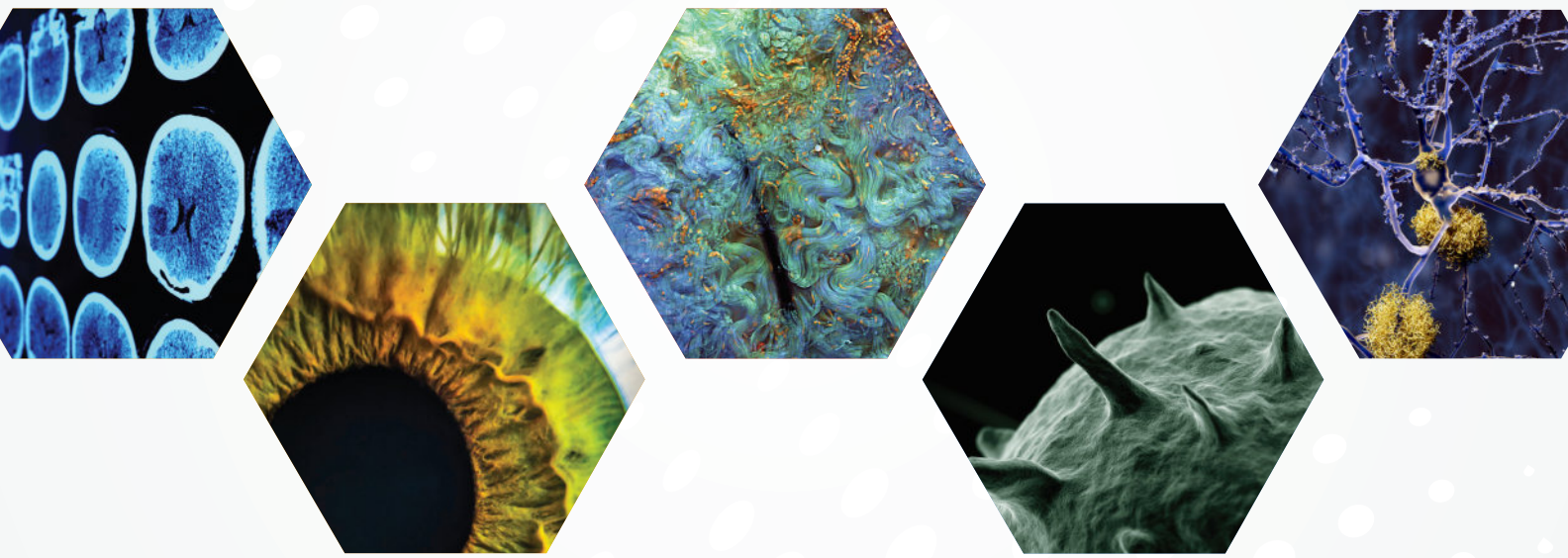

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Measuring Metacognitive Knowledge in Undergraduates

By Mary Spiro

If you dissect the word *metacognition* into its Greek and Latin roots you get a word that means "self-awareness" and "the act of acquiring knowledge"—that is, being aware of how one learns. But how can we become more aware of how we learn? And how can educators boost metacognitive skills in their students to improve learning, exam scores, problem solving, and other benchmarks of success?

That is the focus of research conducted by Julie Dangremond Stanton from the University of Georgia, Athens. Together with Amanda Sebesta at Saint Louis University and John Dunlosky at Kent State University, Stanton has published "Fostering Metacognition to Support Student Learning and Performance" in a recent issue of *CBE—Life Sciences Education* (www.lifescied.org/doi/10.1187/cbe.20-12-0289). Stanton said that metacognitive knowledge involves both awareness and control (or regulation).

"A student who has well-developed metacognitive knowledge is someone who can distinguish what they do and do not know about a subject, and this allows them to be more efficient in their studying," Stanton said. "In contrast, a student who does not yet have well-developed metacognitive knowledge might recognize terms that relate to a subject and then assume that they know the subject very well."

Likewise, Stanton said that students with good metacognitive control can select strategies for learning that are appropriate for the task (such as an exam) and then adjust those strategies based on outcomes (such as the grade they receive). If they are still developing metacognitive control, they may do poorly on a test and then assume that increasing the time they spend studying will improve performance, when this may not, in fact, be the best course of action.

"I like to think of metacognition as learning how to learn," added Sebesta, "and knowing what strategies are out there that can help us learn and then knowing when, how, and why to use them." Many students gain these skills organically through experience and trial and error. But in their current paper, Stanton, Sebesta, and Dunlosky have created a guide filled with actionable evidence-based strategies that instructors can implement immediately in the classroom. The guide, which can be found online at https://bit.ly/3BqK5Sn, has 14 different standalone nodes that instructors can use to help students be metacognitive in their learning. Click on a node and it will open a new window with suggestions to try in the classroom and a summary of the key research papers that support the suggestions. This approach, they said, could be used not only in STEM classrooms but in almost any undergraduate course.

Under the node "What Students SHOULD Do," for example, there are three recommendations, written by Sebesta, which can help improve student metacognitive control. These include self-testing methods, such as flashcards, that students can use to improve information retrieval; spacing, or spreading out study sessions over time—the opposite of cramming for an exam; and interleaving, where students study unrelated parts of content together. This last technique naturally creates spacing and allows students to develop comparisons between and among course material.

"Instructors can help students reframe how they study," Sebesta said, "which gives students flexibility to spend more time with the concepts they find more

challenging." Sebesta added that educators should build discussions of metacognition right into the content of the course. "They should reserve class time to talk about metacognition skills. It can be incorporated in the teaching and assessment practices. Gaining these skills can become a goal of the course."

The paper also discusses "social metacognition" and offers strategies for improving outcomes and learning from group projects. Stanton added that students can be trained to ask simple but specific questions that will help them assess how well they and their peers are learning. This helps students to stimulate metacognition in each other and forces group participants to put their thoughts into words, she said.

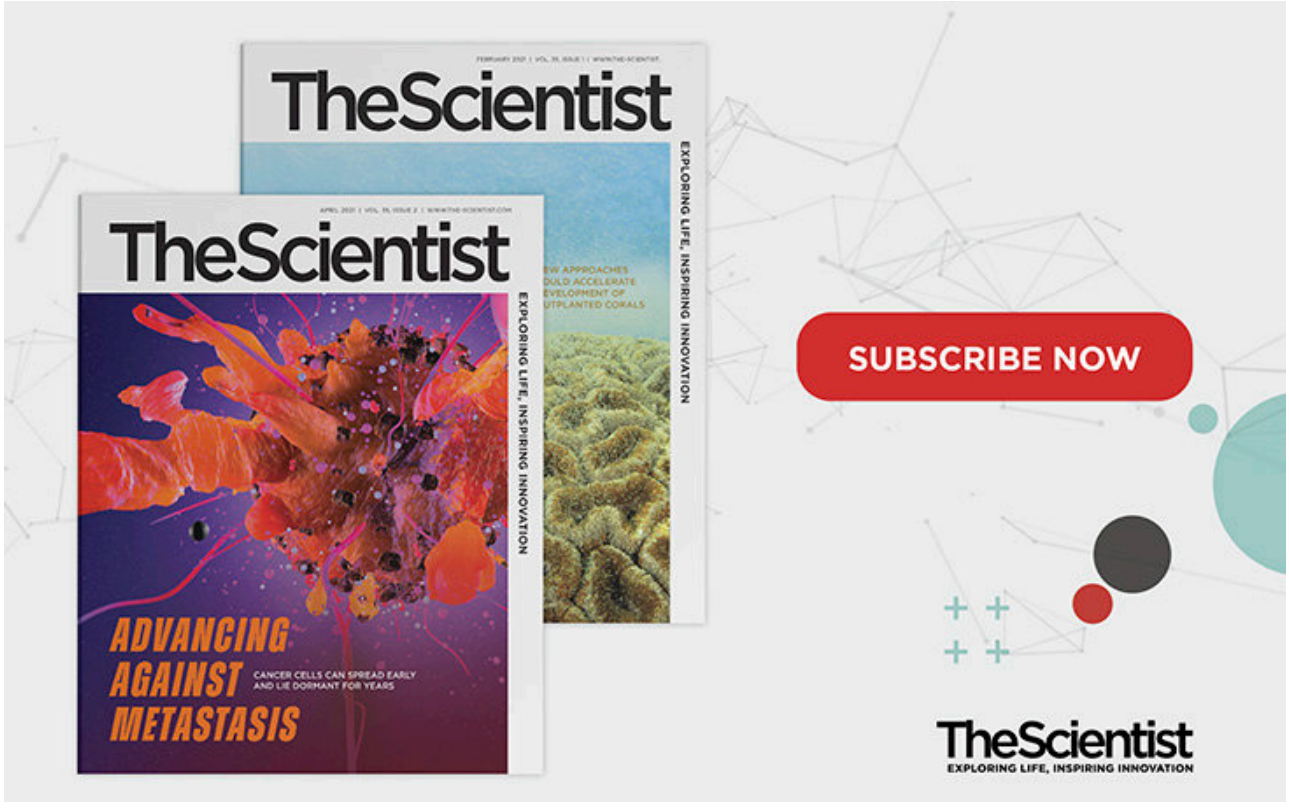
"Studying [individual] metacognition is a challenge because we are trying to measure something that is a thought inside someone's head that they may not be able to put into words," Stanton said.

Stanton said she hoped that educators who use their guide will offer feedback, and she invited educators to be a part of the data-gathering process. While grades are one measure of the success of these recommendations, she said that interviewing students about how they think these strategies are impacting their learning is also part of the data collection.

Stanton said that her team has received National Science Foundation funding so that they can conduct a longitudinal study to follow the development of metacognition in a group of students from a variety of institutions over four or more years to determine the trajectory of metacognition skills.

"It's exciting because we will get to uncover some of those developmental milestones and see what we as instructors can do to help students reach them earlier on," Stanton added.

A conversation with Stanton and Sebesta can be heard on the August Pathways Podcast here: https://anchor.fm/ascb-pathwayspodcast.



CELL BIO virtual 2021

An Online ASCB | EMBO Meeting

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ASCB prioritizes inclusivity and diversity in science as reflected in the meeting's hot topics and engaging programming. To enhance our inclusive environment, we look to you, our members—as presenters, organizers, and attendees from every career-level, research area, and institution—as leaders to create and plan content that best suits the meeting you want to attend. This is a meeting designed by you.

KEYNOTE LECTURE

Xiaowei Zhuang
Harvard University and HHMI

SYMPOSIA

IMAGING ACROSS SCALES
Tracks: Cellular Dynamics, Signaling and Metabolism

Jan Ellenberg
EMBL Heidelberg, Germany

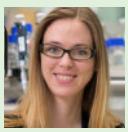
David Van Valen
California Institute of Technology

THE NUCLEUS
Track: Cellular Genome

Jennifer Phillips-Cremins
University of Pennsylvania

Tracy Johnson
University of California, Los Angeles

MODELING ORGANOGENESIS
Track: Communal Cell



Madeline Lancaster
MRC-LMB, UK

Prisca Liberali
FMI Basel, Switzerland

SIGNALING AND METABOLISM
Track: Signaling and Metabolism

Donita Brady
University of Pennsylvania

Bao-Liang Song
Wuhan University, China

BIOMOLECULAR CONDENSATES
Tracks: Cellular Dynamics, Physical Cell

Amy Gladfelter
University of North Carolina at Chapel Hill

Simon Alberti
TU Dresden, Germany

CELL AND TISSUE MECHANICS
Track: Physical Cell

Sara A. Wickstrom
University of Helsinki, Finland

Enrique De La Cruz
Yale University

INTRA- AND INTERCELLULAR COMMUNICATION
Tracks: Specialized Cell and Evolution, Cellular Dyanmics

Chenghua Gu
Harvard Medical School

Maya Schuldiner
Weizmann Institute of Science, Israel

DISEASE AND AGING
Tracks: Cells in Distress and Disease, Signaling and Metabolism

Vishva M. Dixit
Genentech, Inc.

Noboru Mizushima
The University of Tokyo, Japan

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KEY DATES AND DEADLINES

Registration and Abstract Submission Now Open

September 1
Abstract Submission Deadline (for poster presentation)

September 30
Early Registration Deadline

October 12
Final Abstract Submission Deadline (for poster presentation only)

November 23
Registration Cancellation Deadline

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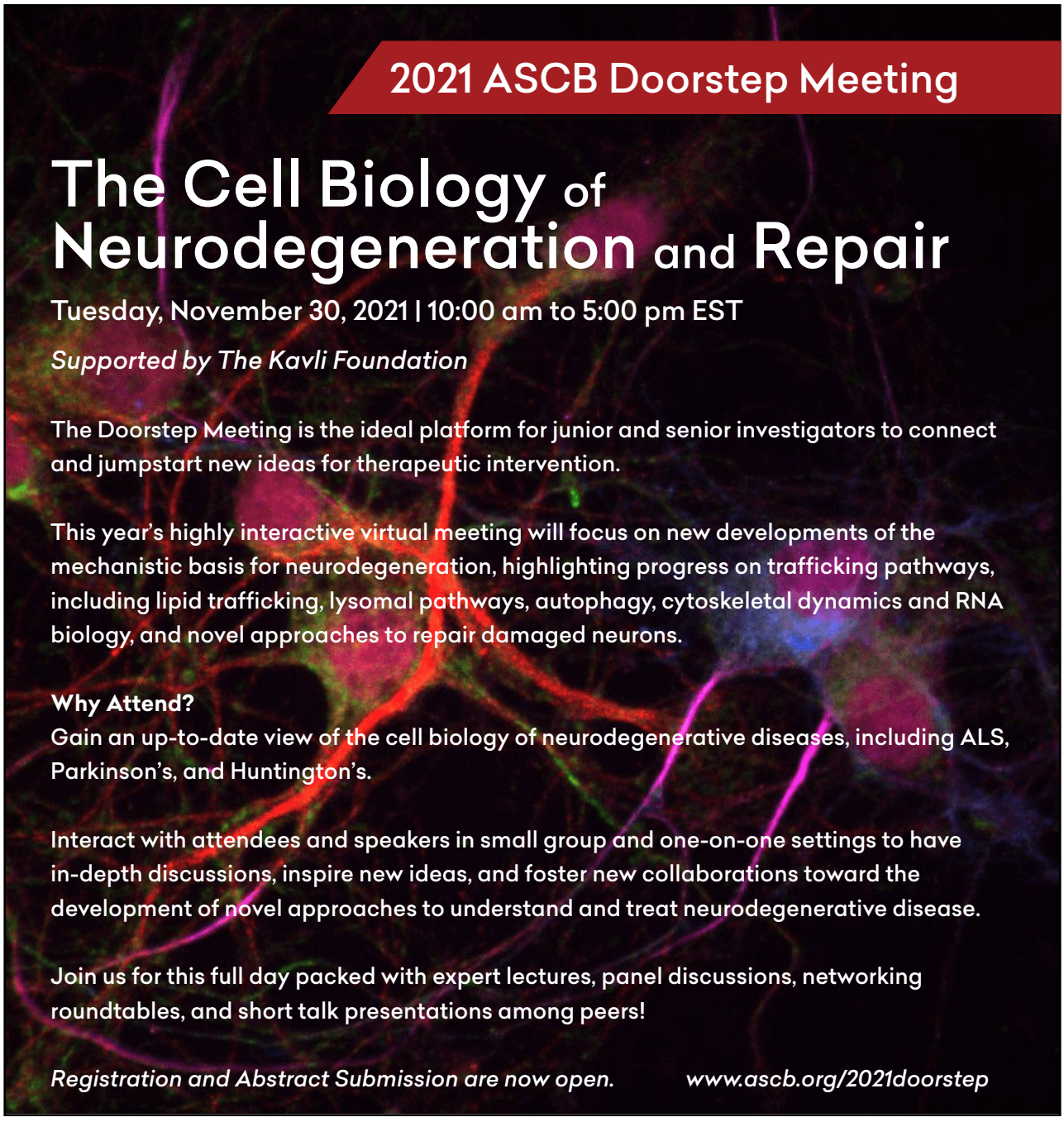


2021 ASCB Doorstep Meeting

The Cell Biology of Neurodegeneration and Repair

Tuesday, November 30, 2021 | 10:00 am to 5:00 pm EST

Supported by The Kavli Foundation

The Doorstep Meeting is the ideal platform for junior and senior investigators to connect and jumpstart new ideas for therapeutic intervention.

This year's highly interactive virtual meeting will focus on new developments of the mechanistic basis for neurodegeneration, highlighting progress on trafficking pathways, including lipid trafficking, lysomal pathways, autophagy, cytoskeletal dynamics and RNA biology, and novel approaches to repair damaged neurons.

Why Attend?
Gain an up-to-date view of the cell biology of neurodegenerative diseases, including ALS, Parkinson's, and Huntington's.

Interact with attendees and speakers in small group and one-on-one settings to have in-depth discussions, inspire new ideas, and foster new collaborations toward the development of novel approaches to understand and treat neurodegenerative disease.

Join us for this full day packed with expert lectures, panel discussions, networking roundtables, and short talk presentations among peers!

Registration and Abstract Submission are now open. *www.ascb.org/2021doorstep*

Want to Give a Short Talk at the Virtual Doorstep Meeting?

Participants will have the unique opportunity to present a short talk in front of their peers while receiving immediate feedback from experts. Apply today for this great skills-building experience! Must be registered by October 26 to be considered.

Abstract Deadline: Friday, October 1

Emerging Voices

The Sound of Science: Hearing Impacts Scientists

By Suzanne Craig

I am a third-year PhD student at the University of Michigan in the Molecular, Cellular, and Developmental Biology program. I am also a hard-of-hearing (HOH) student. HOH refers to difficulty hearing caused by many disorders that result in hearing loss ranging from mild to severe. My hearing loss is classified as a genetic, sensorineural hearing loss that is present at birth and characterized by difficulty understanding speech.

When asked to describe "how I hear," I usually say that hearing is like dial-flipping through radio stations and piecing together the snippets of words to catch a sentence. A truer description of the sensation is difficult, as I'm sure the reader can imagine; hearing loss, and the way sound is heard and processed, is a multifaceted experience. I have found that the short film by National Geographic "What It's Like to Read Lips," is a close replication and does an incredible job capturing the challenges of lip-reading. I recommend it as a starting place for anyone who is interested in experiencing and understanding how hearing loss affects day-to-day activities. My hearing loss has profoundly affected my participation in science, and in the spirit of increasing diversity in the scientific community, I'd like to share my experiences, trials, and victories.

What Sound Does Science Make?

Anyone who has graduated through the ranks of undergraduate to graduate research realizes that there is a striking difference between the learning plans of undergraduate biology courses and those of graduate courses. They are so different, in fact, that I have often heard many versions of the phrase, "The first thing I learned in graduate school was to forget everything I learned during my undergraduate classes." While this is usually said to describe the depth, minutiae, and exceptions to biological concepts, it is also true for the teaching styles in undergraduate versus graduate classrooms. As an undergraduate biology major, my lessons focused on readings before class, paying attention during lectures, and applying material on exams. This is drastically different from the way we learn about science beyond our bachelor's degrees.

As an undergraduate, I performed well in my classes because they were isolated, structured learning environments that were always supported by a written form of communication. I would pre-read the chapters, I took notes in a silent lecture hall, and I was questioned about my knowledge through a written exam. This structure was so accessible that I was a paid notetaker for my biology classes through the Department for Disability Access and Advising. To me, this proved that there was no difference between me and my peers—I felt as though I had "conquered" my disability. This temporary comfort came to a crashing halt the moment I stepped foot into a scientific conference.

Scientific conferences of any size present a major hearing obstacle. At the forefront of this obstacle is the presentation of "spoken science," e.g., posters, talks, and audience questions. All of these formats rely on an ability to rapidly absorb and process auditory information, often in noisy environments, and each of these areas possesses its own challenges. For those who rely on lip-reading to bridge the gap in spoken communication, these challenges are confounded by a single common factor: people. Depending on the individual, they may speak at an unusual speed, have facial hair, have an accent, speak quietly, mumble, or face their slides or data when they speak (this is my personal arch nemesis). Or perhaps they are a perfect speaker with pristine enunciation, but they are far

away. Or maybe they are on a stage with an overhead light that obscures their facial features. Perhaps there is a bad microphone, or worse, no microphone.

However, these situations are not devoid of visual aids! Poster sessions contain posters and talks contain PowerPoint slides. While this is true, these visual aids communicate only certain parts of the entire message. Posters are edited for extreme brevity, which often means that written words are removed to favor graphical abstracts and data. Similarly, the PowerPoints that support a talk are often data-forward, meaning that text is often reduced to bullet points or discarded entirely. Although the reduction of text makes for more direct posters and more interesting talks, this excludes individuals who may be more reliant on reading text to reinforce understanding.

The Current State of Hearing Assistance

One of the massive barriers to science careers that deaf and HOH people face is a lack of scientific signs in American Sign Language (ASL). For those unfamiliar with ASL, much of ASL communication is done through improvisation and combined signs; there are actually very few designated signs for words and some are simply spelled out. For example, if I wanted to say "cytoskeleton" in a conversation, I would not be able to sign it. I would have to fingerspell, meaning that every time I wanted to say it, I would make the sign for each letter: C-Y-T-O-S-K-E-L-E-T-O-N. Obviously, in a scientific conversation where many of the words communicated would be scientific in nature and thus not represented by a sign, this results in a very long, exhausting exchange. In an effort to mitigate this gap, there are online platforms that accept submissions to coin new ASL signs based on community feedback (see ASLcore.org and ASLClear.org).

While there are resources and aids available to deaf and HOH students—from interpreters, to microphones worn by speakers that can connect to an individual's hearing aids, to several kinds of captioning services—they are designed to cover a broad spectrum of hearing disorders, and the hearing needs of any one individual student may not be captured. There are services that employ live-captioning to provide a text companion to spoken word, but my personal experience with these technologies has been both frustrating and futile. Captioning services on streaming platforms like Zoom are catastrophically inaccurate when trying to decipher scientific conversations (I invite you to turn your captions on during your next meeting). As a graduate student instructor this fall, I took a deep dive into the captioning services available through multiple streaming platforms and found that there is limited ability to add vocabulary words to the program glossary. With the number of scientific words that are not captured by the software and the restricted ability to expand the glossary, it would be impossible to use captioning on these platforms to cover more than one or two classes, let alone a conference.

As a first-year PhD student, I was excited to learn about Communication Access Realtime Translation (CART), which is a revolutionary speech-to-text service that is actually connected, not to a captioning software, but to a live human being. The speaker wears a microphone that feeds to the technician, who translates the speech into text using a keyboard that uses phonetic sounds instead of letters (i.e., stenography). I tried CART services for a seminar course offered by my department to see if it would improve my comprehension. However, I found that CART, too, had limitations; it was time-consuming to set up the program before class, and I had to explain to each speaker that there would be two microphones they would be wearing so that I could "hear" (and that, yes, they *had* to use both). Only 1 out of 15 seminar speakers submitted their slides to the CART service the night before their talk as requested, and there were still many words that the technician was unfamiliar with. In the end, I abandoned the service because it was too distracting, and more times than not, I had to fill in the places where the technician didn't know the word either. I think that this technology has a lot of promise, but it's not going to be useful until there are technicians who are well-versed in a broad array of scientific terminology. Interestingly, I received many positive comments about this technology from fellow students who were

non-native English speakers, which indicates to me that the technology could be helpful to many scientists who would benefit from a visual aid to understand a topic.

Navigating Sound during a Pandemic: "Can You Hear Me Now?"

As hundreds of lectures, seminars, and entire conferences shifted to an online format last spring, it seemed that online learning would be an equalizer. No longer would there be background noise or the need for speakers to turn around to see their slides, and captioning services exist on many of the mainstream video conferencing platforms (although I have discussed those limitations above). However, video conferencing comes with a new set of challenges: unstable internet connections, a plethora of unfavorable audio qualities, users neglecting their cameras, and background noise. An unexpected complication was our return to laboratories following lockdown; when scientists are joining meetings from their lab space, all of the aforementioned challenges are complicated by the speaker wearing a mask, and the addition of muffling the sound through fabric only adds to the problem.

The Future of Hearing Assistance

STEM is one of the least represented careers in deaf and HOH populations; I myself have struggled to find ways to make my career more accessible to me. Old stigmas still exist such as the outdated belief that it would be a safety hazard to employ deaf and HOH persons, and technology is balanced on the edge of a confusing juxtaposition between uselessness and innovation. I dream about attending talks that are accompanied by live subtitles and that those subtitle technologies are familiar with the scientific words that will be used. I truly think that the CART technology is on the brink of something great, but will never reach full potential until it is staffed by stenographers who are also scientists. I haven't seen any sign language interpreters at the conferences I have attended so far, but I think this is another area that deserves attention. If you as a speaker are looking to reach a wider hearing and non-hearing audience, expand the written word that accompanies your talk or lecture:

- Provide transcripts (if you have practiced your talk and have a good idea of what you'll be saying).
- Add comprehensive lists of keywords to your slides (include acronyms, abbreviations, and jargon).
- Add visual cues to your slides.
- Explore prerecorded talk transcripts (there are many applications that provide transcripts; the transcript can then be edited for accuracy and uploaded alongside the talk).

I hope that one of the takeaways from the pandemic is the success of recorded talks, even those that happen in person, in order to provide transcripts and reach a wider audience. Despite the challenges and frustrations of being a HOH student and scientist, I have found that most people are happy to make meaningful changes to accommodate me. My lab-mates are very conscientious about facing me when they speak and using clear enunciation. In mask-wearing times this also means being patient while repeating this process several times in a row, with increasing volume. I am very grateful to be surrounded by people who care about me and my inclusion. I am hopeful that the future of science is more diverse and accessible, and I believe that those changes come from education, inclusion, and acceptance.

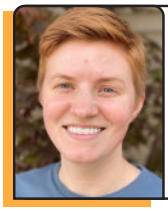
Resources

For more information on the needs and challenges of deaf and HOH scientists, please see the following articles:

www.sciencemag.org/careers/2007/03/deaf-needs-hearing-impaired-scientists

www.ncbi.nlm.nih.gov/pmc/articles/PMC6234809/pdf/cbe-17-es10.pdf

https://leaps.org/deaf-scientists-just-created-over-1000-new-signs-to-dramatically-improve-ability-to-communicate/particle-3



About the Author

Suzanne Craig is a PhD student in the Molecular, Cellular, and Developmental Biology Department at the University of Michigan.

A column by the Minorities Affairs Committee

Diversity Matters

Building Community through Transformative Justice in Education

By Elva Díaz

"Who are you? Why are you here?" I was not expecting to be asked these questions at the start of a workshop on transformative justice at my home institution. Like many individuals I was inspired by the 2020 national racial awakening to take action. As a scientist I began by researching the problem. I read articles about the history of structural racism in the United States. I participated in workshops on recognizing microaggressions, implicit biases, and social inequities in academia. I attended countless seminars on diversity, equity, and inclusion (DEI) initiatives.

As chair of the Neuroscience graduate program, I established a DEI committee composed of faculty, staff, and students. We held focus groups and surveyed faculty, staff, and students to assess the climate of the Neuroscience graduate program. We organized a workshop that focused on recognizing microaggressions in response to the results of the climate survey. We incorporated antiracist training into the orientation for incoming first-year graduate students. We partnered with other programs on campus that were establishing similar initiatives. However, I always returned to the realization that these long-standing social injustices and inequities we were trying to address are embedded within the very fabric of our institutions. These initiatives are steps in the right direction but address the symptoms not the root cause. I now recognize along with many others that the institution of science is part of the problem, as are all of us who do not advocate for change.

> "By first admitting that science has been part of the problem in the widening gap in equality we can start to understand what we must do to start addressing the problem"
> *—Marcia McNutt, President of the National Academy of Sciences*

I was particularly enlightened after attending a seminar from Maisha and Lawrence "Torrey" Winn, co-directors of the Transformative Justice in Education (TJE) Center in the School of Education at the University of California, Davis (https://tje.sf.ucdavis.edu). The mission of the TJE Center is to collaborate with researchers and practitioners who are committed to imagining just futures for children and their families by addressing harm caused by racial inequities and creating restorative, transformative, and humanizing learning committees. Restorative justice is a paradigm that focuses on relationships, listening, and consensus building through a variety of practices including (but not limited to) community-building circles and repairing-harm circles. Restorative justice is most often associated with prison reform. A transformative justice approach, while grounded in restorative justice, is more expansive and seeks to create space for institutional reform based on the five pedagogical stances: history/ies matters; race matters; justice matters; language matters; and futures matter.[1,2] Critically, a transformative justice approach is a journey, not a destination. Like science, it is a life-long learning process.

The TJE Center organizes workshops for the community to provide processes and tools to apply in the pursuit of racial equity using a transformative justice approach. I organized a TJE workshop for department leadership, faculty, staff, and trainees that took place this past spring. The first workshop focused on building community, the first tier of restorative justice work. While I felt that I had established good working relationships with my colleagues, after this first session I realized that I did not really know anyone that well and that my colleagues did not really know me. Relationships are at the core of justice, and we as members of the institution of science must be able to reconcile our own individual and shared histories as the first step in transforming the institution of science.

"Who are you? Why are you here?" I had never really considered this question about myself or any of my colleagues. I am a native Californian born and raised in the Bay Area to parents originally from Mexico. I am privileged because of the hard work of my parents, their older siblings, and their parents, which allowed both of my parents to obtain a college education and become high school teachers. I am the oldest of four children, and we all went to college; it was always "when" not "if." I am privileged because my parents could afford to pay for my college tuition. I always liked science and math and I benefited from programs as a high school and college student that target individuals from underrepresented backgrounds. I feel an important responsibility to mentor students, especially from Latinx backgrounds, who were not afforded the privilege that I had. I learned that many of my colleagues were first-generation college students, some worked their way through school, and many were children of immigrants or immigrants themselves. Most importantly, I learned that we could all find common ground.

The second workshop focused on the three pillars of restorative justice: harms, needs, and obligations. Participants were asked to recognize that everyone has harmed someone else and everyone has experienced harm. We participated in small group discussions to help us understand the foundations of harm and wrongdoing and define pathways for making the wrong things right. The third workshop focused on learning how to become communicators within our own communities to allow for thoughtful and meaningful discussions on race, class, and privilege.

The second and third workshops seemed similar to other seminars and workshops that I had participated in and yet they were different because of the community building that took place in the first workshop. The first workshop made all the difference for each of us to have meaningful conversations about these sensitive topics. We had a built a community of trust as a foundation from which to grow. I have subsequently incorporated community building into my research, teaching, and service activities with positive responses and outcomes.

"Who are you? Why are you here?" I encourage you to start your own journey toward transformative justice by answering these questions with your colleagues, including faculty, staff, and trainees. It is the beginning of a transformative journey.

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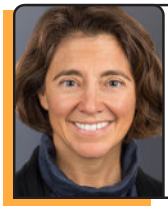
[1]Winn MT (2018). *Justice on Both Sides: Transforming Education through Restorative Justice*. Cambridge: Harvard Education Press.

[2]Winn MT (2019). Paradigm shifting toward justice in teacher education. University of Michigan: Teachingworks: hwww.teachingworks.org/images/files/Winn_TeachingWorks.pdf.



About the Author

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Science and Society

A column by the Public Policy Committee

A Clown Car or a Minivan?

By Kevin M. Wilson

The chance that metaphoric celestial bodies would align to allow for the development of new federal science policy[1] has actually become the legislative version of a race between an overloaded clown car and a sensible minivan.

The initial goal was to add a new directorate to the National Science Foundation (NSF) that would focus on cutting-edge science to help to keep the United States the international leader in science. The House of Representatives and the Senate bills began with the same goals but took different paths.

The Senate bill, which began life with grander goals and a larger sticker price than its House of Representatives competitor, became unrecognizable as soon as it hit the Senate floor. Senators submitted over 600 amendments for consideration during Senate floor debate. A small percentage of those amendments were debated and voted on but by the time it came to vote on the final bill, it was barely recognizable; even the name of the bill changed.

The Senate bill calls for the creation of a new National Science Foundation (NSF) Directorate for Technology and Innovation, with a $5.8 billion price tag for each of the first five years (the original bill allotted $20 billion per year). Also included is more funding for the NSF, increasing the budget from $8.5 billion in FY20 to $21.3 billion in FY26, with funding for basic and fundamental research increasing 40% by FY26.

Unlike its younger self, the final bill left the Senate floor with $39 billion to support the U.S. semiconductor industry. A number of new provisions were added to the bill to address real and perceived espionage threats to the American science community from China. Those states with limited research communities would see a huge increase in funding under the bill. This program, EPSCoR (Established Program to Stimulate Competitive Research), would see an increase from 0.75% of the NSF budget to 20% of the NSF annual budget. The bill, crafted to expand the scope of the NSF, also ended up including a provision continuing the authority of NASA, including congressional permission to land on the moon and on Mars. Even though the final bill appeared to include something for everyone, 32 Senators still voted against it.

It is important to remember that this bill, along with the House bill, doesn't include any actual funding. In congressional terms, it merely authorizes money to be spent but does not actually appropriate the money. Think of them as legislative wish lists.

Soon after the Senate's legislative clown car left the garage, the House of Representatives fired up the family minivan, a commonsense bill that isn't flashy but understands its purpose. Like the Senate bill, the House bill creates a new directorate aimed at taking big risks with new cutting-edge areas of science. Unlike the Senate bill, however, it slowly increases the NSF budget. After an initial increase of $2 billion, the House bill increases the NSF budget to $13.3 billion in FY26, a 6% increase per year. It also addresses security concerns by, in part, requiring NSF-funded researchers to submit a statement identifying potential risks associated with their proposal.

As a sign of the minivan-ness of the bill, it faced almost no opposition on its path through the House. The House Committee on Science, Space, and Technology approved the bill by voice vote and when it came to passage by the full House, it received only 67 no votes after the minority agreed to pass the bill without offering amendments.

The big question is what happens next. The two bills are very different in size and scope so it could be a big effort to find agreement. A simple solution would be for the House to pass the Senate-passed bill but that seems almost as unlikely as the Senate passing the House-passed bill.

Reference

[1]Wilson KM (2021). Are the policy planets in line again? *ASCB Newsletter* 44(3), 8–10. www.ascb.org/science-policy/are-the-policy-planets-in-line-again.

The Knowns and Unknowns of ARPA-H

By Kevin M. Wilson

The late Donald Rumsfeld, who served as Secretary of Defense twice as well as White House Chief of Staff, beginning his career in public service as a member of Congress, is famous in Washington for his dictums. None is more famous than "as we know, there are known knowns; there are things we know we know. We also know there are known unknowns; that is to say we know there are some things we do not know. But there are also unknown unknowns—the ones we don't know we don't know."

This Rumsfeld aphorism comes to mind when trying to explain a proposal by the Biden administration to create the Advanced Research Projects Agency for Health (ARPA-H). What is known is that the administration included this new agency in its FY22 budget. It is also known that the administration would like it to reside within the U.S. National Institutes of Health (NIH) and that the administration has proposed a three-year budget of $6.5 billion for the new agency.

Unfortunately, there are many known unknowns—things we know we do not know. It remains unknown what the real mission of the agency will be. In formally announcing the new agency, President Biden said during a joint session of Congress in April, "This is what it would do, it would have a singular purpose to develop breakthroughs to prevent, detect, and treat diseases like Alzheimer's, diabetes, and cancer." NIH Director Francis Collins has proposed a number of uses for the new agency. In testimony on Capitol Hill, he has suggested that it could help the NIH use mRNA technology to speed up the process of developing cancer vaccines. The Director also said that another role for ARPA-H would be to develop "a new approach to hearing aid development."

For the longest time this spring, the agency's exact location within the federal government was also a known unknown. Patient groups unhappy with the speed of research at the NIH have been pushing for the creation of an independent agency. The release of the 2022 budget proposal indicates what President Biden thinks, but powerful lobbyists in Washington could help change the minds of those in Congress.

Another known unknown is the depth of Congressional support for the proposal. Support appears to be lukewarm, in part because those responsible for funding the NIH and other health-related agencies see a real need to pick up the bureaucratic pieces at agencies such as the Centers for Disease Control and Prevention (CDC) after the pandemic. That $6.5 billion might need to be spent at other health-related agencies.

It is entirely possible that the ultimate fate of ARPA-H won't be written until November and December of 2021 when all the hard budget deals get struck on Capitol Hill. If that's the case, the future of ARPA-H may depend on the unknown unknowns.

Office Hours

with the Education Committee

Make Your Course Accessible to All for the Benefit of All

By Alison Dell

Dear Education Committee,

Each year students in my classes approach me to request learning accommodations for disabilities or special circumstances. In addition to these student-specific accommodations like extra time on tests, how can I make my sections of introductory biology and cell biology more accessible?

—Wanting to Accommodate

Dear Wanting to Accommodate,

Educators leading introductory "filter" or "weedout" classes with high drop/fail/withdrawal rates may recognize the larger problem embedded in this question. The traditional STEM teaching paradigm is broken, hurting many students including those with disabilities. Universal design for learning (UDL) could be a useful approach to improving overall accessibility within courses and curricula. The idea is based on the architectural concept of universal design, which introduced ramps and cut-out curbs to improve access to buildings. These interventions also broaden overall accessibility: A ramp might have been provided at a building entrance with a wheelchair user in mind, but the same ramp also benefits people with bicycles, strollers, roller skates, or heavy cargo. In a learning context, a class that has been designed toward accessibility benefits all students, including those with documented disabilities who choose to disclose that information to their instructors. Captioned lectures, for example, can help those with learning differences, members of the deaf community, English language learners, and students who are in the library while they review video-based course materials.

UDL strategies have been widely implemented in K–12 curricula, and more recently in higher education as part of a broader conversation about promoting inclusivity in learning environments. (Stanford's Center for Teaching and Learning has excellent teaching tools on this topic: https://ctl.stanford.edu/promote-inclusive-learning/teaching-tools.) Here I will be focusing on using UDL principles to improve accessibility of course content. The recommendations of UDL include promoting accessibility at three different interrelated learning processes: engaging with the concept, learning the concept, and demonstrating mastery of the concept. This helpful interactive graphic provides details and includes links to research supporting the approach in K–20 education: https://udlguidelines.cast.org. (Some of these references are dated. See Suggested Reading for more-current studies focusing on higher education and assessing benefits both for students with disabilities and for overall class performance.)

UDL is ideally a curriculum-wide intervention, supported by learning technologists, student support, and administration. If you are teaching just one section of a course it might not be feasible to accept assignments in different formats for different students, but you can check to make sure a screen reader can interpret your PDF and read it to both a student with vision problems as well as a commuter student driving to class, work, or daycare.

Overall, make it easy for students to engage with and learn the material by presenting it in different ways. Why? Students will be listening, watching, or reading and they will experience the material through different devices one of which is almost certainly a smartphone. If you were teaching during the height of the pandemic and its associated lockdowns, at least some of your course materials are likely in an online format. Even if you are new to teaching, there are a lot of cell biology resources out there, including the Allen Institute, HHMI Biointeractive, Xbio, and iBiology. These resources and materials can complement your teaching even when you have returned to in-person instruction.

Here are some easy steps to make your course materials more accessible based on UDL approaches.

1. **Interface.** Do you know what your learning management system (e.g., Canvas) page looks like when accessed from a phone? You should check.
2. **Files.** PDFs should include optical character recognition (OCR; https://guides.library.illinois.edu/OCR) so a screen reader can interpret them and read them aloud to your students. Unless your course relies on scanned documents, you should be able to use OCR except for older papers. The files that you upload should be an appropriate resolution so as not to tax your students' data plans.
3. **Captions.** Add captions to your videos. If you have recorded presentations from last year, and want to use them force yourself to watch them first. (I know. It's the worst. Do it anyway.) Edit to make sure your recordings are short—not more than 10 minutes. If you did not use captions in your presentations, you can add them retroactively either by uploading a file containing a transcript or using automatic transcription and then fixing the mistakes. Zoom's automated transcription is generally terrible for biology classes. The screencast software that I use (screencastomatic) does know I mean "cell" like the basic unit of life and not "sell" like goods and services, but it still makes mistakes. YouTube also has a closed caption feature and you can make your videos available only to those with a link, i.e., your students.
4. **Describe images.** Use alt-text—short written descriptions of images—and when you are discussing an image make sure you describe it as you go.
5. **Use direct links to open source materials when possible.** You know that feeling when you click on a link to a paper and you have to log in to three things and then hit a paywall? Yes. And that was something you were already interested in. How many screens will someone new to the material go through before they get your thing? Not many.
6. **Put your efforts where they are most needed.** Start with the topics your students struggle with. Do steps 1–7 above. Include links to other resources you find helpful: animations, lectures, etc.

Six steps are a start. You've opened different windows onto the course concepts providing more entry points for students to learn.

Further Reading

Tobin TJ, Behling K (2018). *Reach Everyone, Teach Everyone: Universal Design for Learning in Higher Education*. Morgantown: West Virginia University Press.

Schreffler J, Vasquez III E, Chini J, and James W (2019). Universal design for learning in postsecondary STEM education for students with disabilities: A systematic literature review. *International Journal of STEM Education* 6(1):8. doi: 10.1186/s40594-019-0161-8.

Increasing Accessibility of College STEM Courses through Faculty Development in Universal Design for Learning | DO-IT. Retrieved July 12, 2021. https://www.washington.edu/doit/increasing-accessibility-college-stem-courses-through-faculty-development-universal-design-learning.

A column by the Women in Cell Biology (WICB) Committee

Career Navigator

Disability Is Diversity: How to Increase Accessibility in Science

By Alexis S. Mobley

The pandemic has changed the world as everyone knows it. The general public has come to understand social distancing, better handwashing, and the effectiveness of masking for infectious disease control. With the prominence of video conferencing tools like Zoom, WebEx, and Google Meet, more attention has been drawn to the needs of a hidden community: disabled people. Disabled people are a prominent part of the population, and the burden of requesting and following through with proper accommodations is put on their shoulders. To relieve this burden, calls for universal accessibility have been loud and hard to ignore. Although individual needs for accommodations can be vastly different, even for people with the same diagnosis, there are bare minimum changes allies can make to support the disabled community in science and beyond.

My rules to building presentations assume I have one deaf, one blind, and one junior high individual in the room.

Discrimination Is Rampant against Disabled People

Disability is prevalent in the general population. In fact, the Centers for Disease Control and Prevention reports that 25% of the population is disabled, even if individuals don't identify with the label themselves. This percentage will continue to grow with the newest influx of long COVID patients. Disabled and disability continue to be a dirty words, with many in the community continuing to be infantilized for our conditions, when in fact, we just need a little help to get by. Just because we need some time extensions to get work done, devices to be mobile, or literally a helping hand, many of us are seen as lesser humans. We often suffer in silence, lacking the energy (commonly referred to as spoons) to advocate for ourselves and our community.

Unintentionally or not, the actions of the scientific community perpetuate ableism by supporting discriminatory systems that work against the disabled community. Most universities only require self-reporting of disabilities, even if a person isn't interested in filing for formal accommodations. Most disabled people prefer not to self-identify as they are afraid of backlash and retaliation.

Once a person decides to seek out formal accommodations, they are required to get a functional capacity evaluation (FCE; for physical disabilities), mental evaluations and surveys (for mental disabilities), and several certified letters from their healthcare providers as proof and documentation of their disability and the accommodations they require. Even with good insurance, the FCE or mental evaluations probably are not covered, and they can cost $500 or more. Once these evaluations are secured, there is additional time and money required to see a physician to go over these evaluations, sign paperwork, and identify the person to receive the certified letters.

Once the application forms are filled out, they must go through the 504 Disability Office, Human Resources, and the department/school to coordinate the (hopefully) approved accommodations. With

the cross-office coordination that is required, applications can take weeks to months for approval. It is then the responsibility of the disabled person to report these accommodations to their professors and supervisors. Furthermore, these accommodations don't follow the person during their tenure at the university. They must renew these accommodations at different time points arbitrarily determined by the university. Professors and supervisors all too often do not honor legally required work accommodations; this creates uncomfortable environments, perpetuating discrimination and upholding ableist systems for trainees and those with lesser positions of power. These undue burdens make it harder for disabled people to continue their work and receive the education they rightfully deserve.

If invited to give a presentation, require that captions be there.

Seeking and receiving accommodations shouldn't be a struggle, embarrassing, or burdensome. Ableism keeps out some of the brightest minds and causes many to leave yet another unwelcoming space. If more education and community were provided for disabled academics, it would become apparent how critically universal accessibility is needed. Universal accessibility is a great way to start helping and advocating for the disabled community. This would remove the burden on disabled people to seek out the essential tools they need to thrive in their environments and eliminate the need to out themselves in otherwise hostile environments.

Accessibility: It's Always Important

Accessibility is creating equitable spaces for all individuals to access and understand information in the same manner as everyone else. The Center for Excellence in Universal Design has outlined seven principles to guide accessibility measures: equitable use, flexibility in use, simple and intuitive use, perceptible information, tolerance for error, low physical effort, and size and space for approach for use. This means accessibility efforts should create equivalent, if not identical, means for everyone; options for diverse disabilities; accommodation for those with different literary and intelligence backgrounds; redundancy in the information presented; minimal hazards and fatigue; and an understanding of different body sizes and abilities. My rules to building presentations assume I have one deaf, one blind, and one junior high individual in the room. Providing a space for just these three individuals ensures a welcoming environment for most, if not all.

Here are some crucial steps to creating accessible presentations:

- Keep data simple and redundant using both visuals and simple wording
- Speak slowly and clearly while projecting so your voice can carry across rooms and be picked up by microphones
- Avoid jargon and unnecessary advanced wording
- Describe any and all visuals verbally in your presentations and in alt-text in images (written)
- Provide a copy of your slides in advance
- Utilize color-blind friendly colors and/or differing patterns, styles, and shapes of data points
- Allow open (always available) or closed (available as an option) captioning for all video and in-person events
- Provide transcripts after the event is over
- Provide American Sign Language interpreters at all events and during video conferencing
- Maintain hybrid events for those that have financial, caretaking, and health responsibilities that restrict travel

There are many tools available to implement accessibility within your life. These tools have made it easier for disabled people and provide more

opportunities for abled people by making attendance at meetings easier or remote work more common. That in and of itself is enough to show that this technology is available, has been tested, and can be readily employed to increase the well-being of everyone. Microsoft has started to provide accessibility checks, captions in their PowerPoint presentations, presentation practice with Presentation Coaching, and review of your writing to ensure it is within a certain grade point/intellectual ability level. Zoom and Google Meet provide free captioning within their services. Most people prefer to pay for more accurate captioning using services like Rev or Otter.ai. Programs like Prism can provide quick, simple changes to your data visuals, or use color-blind color palettes available in R. Once you are alert to it, accessibility is not hard to incorporate, but there is some work and money required to integrate it.

Unfortunately, not everyone in academia welcomes these changes. What can scientists and allies do to advocate and ensure equitable spaces for their disabled colleagues? Accommodations will cost money; therefore, budget for them within events and see it as an investment to include otherwise isolated groups of people. Demand accessible spaces when given the opportunity to do so and help elevate the burden placed on disabled individuals. If invited to give a presentation, require that captions be there. Ask for a transcript of the talk after the event, which can be posed as a way to review any questions or answers for further research or evaluation. Listen to and believe the stories of disabled colleagues. There are many great resources and hashtags that you can follow on Twitter like #DisabledInSTEM, #DisabledInHigherEd, and #BlackAndDisabled.

Working toward universal accessibility requires an investment. By creating equitable environments, the increased diversity means more robust ideas. Not only that, but the increase of accessibility will also increase stakeholder participation leading to more meaningful and translational research from the academy. Those that did not previously participate in science now have an easier chance to do so, and this increases the diversity of ideas present. If the proverbial table doesn't have a chair for the marginalized, bring extra chairs. We are in an era where we can easily make bigger tables, so let's do so by including universal accessibility and inviting more disabled people to our spaces.

Resources on Accessibility

https://www.cdc.gov/ncbddd/disabilityandhealth/infographic-disability-impacts-all.html

http://universaldesign.ie/what-is-universal-design/the-7-principles/the-7-principles.html#p1

https://accessibility.psu.edu/microsoftoffice/checker/

https://support.microsoft.com/en-us/office/present-with-real-time-automatic-captions-or-subtitles-in-powerpoint-68d20e49-aec3-456a-939d-34a79e8ddd5f

https://support.microsoft.com/en-us/office/rehearse-your-slide-show-with-presenter-coach-cd7fc941-5c3b-498c-a225-83ef3f64f07b

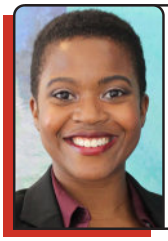
https://support.zoom.us/hc/en-us/articles/207279736-Enabling-and-managing-closed-captioning-and-live-transcription

https://support.google.com/meet/answer/9300310?co=GENIE.Platform%3DDesktop&hl=en

https://www.rev.com

https://otter.ai/login

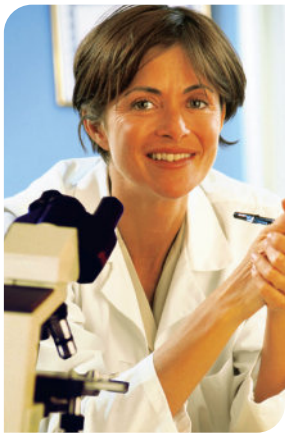
https://cran.r-project.org/web/packages/colorBlindness/vignettes/colorBlindness.html



About the Author

Alexis Mobley is a graduate student at the University of Texas MD Anderson Cancer Center UTHealth Graduate School of Biomedical Sciences. She investigates immune cell communication in the brain in sex differences and age-related diseases.

DEAR LABBY



Got Questions?

Labby has answers. ASCB's popular columnist will select career-related questions for publication and thoughtful response in the *ASCB Newsletter.* Confidentiality guaranteed if requested. Write us at labby@ascb.org.

Returning to the Lab Safely

DEAR LABBY: I am a fourth-year graduate student in cell biology. Our laboratory is about to be able to open without space or mask restrictions as long as people are vaccinated against SARS CoV-2. It is up to the PI of each lab to be satisfied of the proof for those vaccinations. The unvaccinated are still asked to mask and social distance themselves since they are now particularly vulnerable to infection.

I have been working in the lab on a limited schedule since last fall, when we were masked and on strict rotations to keep the lab population low. While I am eager to go back full steam, and am fully vaccinated, I worry that not all my fellow building dwellers and even laboratory colleagues are vaccinated. And I worry that some of the PIs in the building are not circumspect about those vaccinations, as they too want the labs back pumping scientific iron.

How do I balance my safety and my professional progress with these concerns? I am afraid that if I raise these issues, I will be viewed as not committed to my science and to the success of the lab.

—Vaccinated but Worried

DEAR VACCINATED BUT WORRIED: Your concerns are shared by many, many others in the scientific workforce, and we are all taking small steps to be able to be at the bench safely. There are likely others in your building and lab who share your concerns; you all just feel uneasy. It is fine to contact your PI or your department's graduate advisor to voice your worries and learn what protocols exist in your building for those who feel ill or for those who haven't been vaccinated. Also consider suggesting to your PI to add check-ins about anxiety levels as well as check-ins about experimental results in the lab meetings. Your lab is a community that cares for each other. In addition, Labby has seen that many institutions are providing counselors to people during these very challenging times.

Labby does not presume to dispense public health advice, particularly as our understanding of best practices to cope with this pandemic is fluid. For example, as this is being written, the Centers for Disease Control and Prevention have just revised their guidelines on mask wearing. Labby hopes that you (and your university) will pay close attention to guidance being issued by national and local public health experts.

After a year of avoiding each other, trusting each other to be truthful about vaccination status (or symptoms) can be difficult but everyone wants to be safe, vaccinated or not. There are some experiments that use equipment in close quarters, making spacing from others impossible during short periods of time. Again, follow the recommendations of public health officials about the best way to stay safe under such circumstances. Clearly you pay attention to the progress being made against this continuing pandemic. The science about the virus is what informs public health strategies that allow us to work safely.

Enjoy the activities that allow you to continue your career in the sciences safely, as you follow the science of SARS CoV-2. Take care.

—Labby

member profile

Jeff Schinske

By Mary Spiro

Jeff Schinske is the department chair and professor of biology at Foothill College in Los Altos Hills, California. He is also the co-Editor-in-Chief of ASCB's education research journal *CBE—Life Sciences Education* (*LSE*) with Kimberly Tanner at San Francisco State University. He answered a few questions for the *ASCB Newsletter.*

What inspired your love and interest in science?
I'm lucky to have grown up in a family that has a lot of enthusiasm for science. My father was a chemist and his father was an electrical engineer, so I learned to appreciate science early on. My own passion for science took off following visits to the California Academy of Sciences where I saw the amazing diversity in colors and shapes of marine fish in their aquaria. I couldn't believe that such creatures existed, and I had to learn more! This eventually led me to major in marine biology and to study fish speciation through molecular genetics in graduate school.

Why did you decide to become a life science educator?
Similar to the way my passion for science began with my family, so did my interest in education. Teaching runs in my family; my mother and sister as well as my extended family have made education part of their careers. I knew I wanted to do something related to science education but entered graduate school uncertain about exactly what that would be. As part of my graduate studies, I partnered with a middle school teacher in San Francisco and completed graduate seminars in research-based teaching. One of my grad student colleagues suggested that I should think about teaching at a community college. I had not attended community college myself, but this seemed like a good fit.

I taught courses at two community colleges while finishing my graduate work and was immediately hooked. I had never met such brilliant, hardworking, resilient, and creative people as the community college students I served. I felt (and continue to feel) like I need to work as hard as possible to deserve the privilege of teaching such amazing students. I enjoy that pressure and appreciate that I will always have room to improve. My job will never be "done."

What were some of the challenges you have had along your career journey and how did you overcome them?
I struggle with anxiety to the point that it has prevented me from fully engaging in my education and career-related activities. I did not always share this with my students and colleagues, but have found it to be a particularly important point of connection with my students. Many, or perhaps most, of them have similar challenges, and hearing this about me seems to help them realize my class is a place where challenges are accepted and accommodated.

What is your education philosophy?
I believe every student is capable of excelling and meeting the highest of expectations if given the support and resources they need. Though I teach fast-paced, content-rich courses, I begin each term with the goal of every student earning an "A." I've never

achieved that goal, but I keep aiming for it. I try to be active in my classroom, at my college, and on broader scales to push to dismantle systemic inequities that prevent students from achieving their potential and earning that "A."

What do you hope to accomplish as co-Editor-in-Chief of *LSE* with Kimberly Tanner?

I hope to honor and sustain the amazing work of past editors. They have made *LSE* an indispensable resource for educators and education researchers, and the journal has evolved over the years in groundbreaking ways. Going forward, Kimberly and I are both passionate about ensuring the research and perspectives featured in *LSE* are representative of the students, faculty, and researchers in our communities. Analyses of *LSE* papers suggest we still have much work to do on this front.[1] As an example, only around 1% of *LSE* papers feature a community college context, though close to half of all undergraduates are enrolled at community colleges. Similarly, most articles in the analysis of *LSE* papers did not report demographic characteristics of students or look for differential results based on student identities.

It's exciting to see *LSE* papers informing national policy and the practices used in classrooms around the world. We would hope that the practices recommended in the journal will be based on evidence collected in contexts representative of the classrooms where those practices are employed. This likely will require additional research in community college contexts and involving students, faculty, and researchers from traditionally minoritized and marginalized communities.

What advice would you give an aspiring life science educator?

Be kind to yourself and try to always see the best in your students. It's a lot of work to develop engaging and effective lessons, assignments, and assessments for a class. When we see a student not participating in an activity or not turning in an assignment or receiving a low grade on a test, it's all too easy to assume the student was not interested or did not study enough. On closer examination, those students are generally highly motivated, conscientious, and extremely hardworking. However, something about our instructions might have been unclear, or the student might have been enduring extraordinary levels of difficulty unrelated to class, or they might not have felt welcome as a member of the class community. In other words, there might have been deficits related to my class's ability to support the student as opposed to deficits centered around the student themselves.

If I observe students not performing to my expectations, I consider it my job to find out what about my class might be responsible for that underperformance. With a little reflection and some candid feedback from students, I can usually identify a way I could have better structured my teaching to promote success. This is where it's important to be kind to oneself. It's okay to realize that a hard-thought-out lesson could still use improvement.

Tell me about your hobbies or personal interests.

I have two sons, ages 6 and 11, and I try to spend as much time with them as possible! I have a bachelor's degree in saxophone performance and love that my kids are also very interested in music. I'm interested in tattoos—especially blackwork and dotwork styles—and like thinking about possible next tattoos to get. I love basketball and baseball—watching and playing, in spite of not being especially talented at either!

Reference

[1]Lo SM, Gardner GE, Reid J, Napoleon-Fanis V, Carroll P, Smith E, Sato BK (2019). Prevailing questions and methodologies in biology education research: A longitudinal analysis of research in CBE—Life Sciences Education and at the Society for the Advancement of Biology Education Research. *CBE—Life Sciences Education* 18, ar9.

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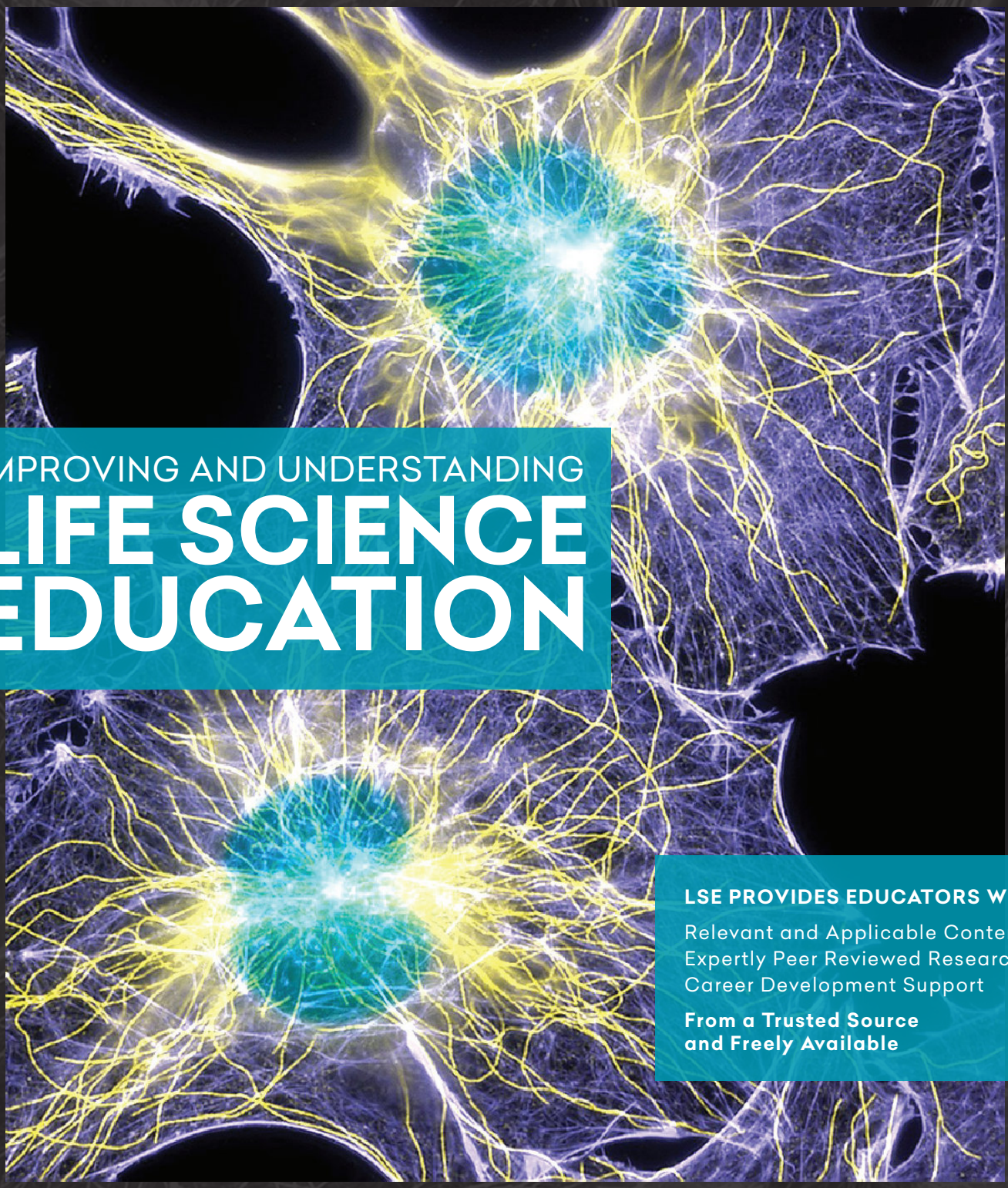

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