“ATLE’s Top 10”
2016 Articles about Teaching and Learning
(in alphabetical order by author)


   a. **Published abstract:** Members of the Joint Working Group on Improving Underrepresented Minorities (URMs) Persistence in Science, Technology, Engineering, and Mathematics (STEM)—convened by the National Institute of General Medical Sciences and the Howard Hughes Medical Institute—review current data and propose deliberation about why the academic “pathways” leak more for URM than white or Asian STEM students. They suggest expanding to include a stronger focus on the institutional barriers that need to be removed and the types of interventions that “lift” students’ interests, commitment, and ability to persist in STEM fields. Using Kurt Lewin’s planned approach to change, the committee describes five recommendations to increase URM persistence in STEM at the undergraduate level. These recommendations capitalize on known successes, recognize the need for accountability, and are framed to facilitate greater progress in the future. The impact of these recommendations rests upon enacting the first recommendation: to track successes and failures at the institutional level and collect data that help explain the existing trends.

   b. **Why this is important:** While the article is targeted towards administration, the take home lessons can be applied by faculty and administration alike. The working group recommends creating strategic partnerships, implementing curriculum that promotes inclusion, considering student resource disparities, and linking work done in STEM fields to personal and culturally valued outcomes. For faculty this might mean reaching out to community and campus partners, considering inquiry-based activities and other evidence-based pedagogies, using resources that are easily accessible, and connecting STEM concepts to real-world benefits and applications, perhaps with guest speakers from the community.


   a. **Published abstract:** Assuming a dialectical approach to technology and pedagogy, this study explores sense-making processes for instructors teaching in a technologically enhanced college classroom environment. Through a series of semi-structured individual and group interviews, seven instructors provided narrative accounts of the problems encountered with progressive instructional technology and their emergent strategies to make sense of and manage it. Three primary dialectical tensions were described: freedom vs. confinement, connectedness vs. fragmentation, and change vs. stability. Two related modes of sense-making in response to these tensions were also uncovered: adaptation, involving day-to-day adjustments to non-routine failures, and reframing, entailing gradual reflection upon the instructors’ roles in the classroom. Implications for the current findings are discussed.

   b. **Why this is important:** This article provides an interesting look into the reasons behind faculty frustrations with regard to classroom technology, as well as some potential actionable strategies for addressing these challenges. Faculty members who can relate with technology frustration but who are also looking for ways to move beyond it may be interested.
   
   a. **Published abstract:** This article describes a study which compares the effectiveness of the flipped classroom relative to the traditional lecture-based classroom. We investigated two implementations of the flipped classroom. The first implementation did not actively encourage cooperative learning, with students progressing through the course at their own pace. With this implementation, student examination scores did not differ between the lecture classes and the flipped classroom. The second implementation was organized with cooperative learning activities. In a randomized control-group pretest-posttest experiment, student scores on a post-test and on the final examination were significantly higher for the flipped classroom group than for the control group receiving traditional lectures. This demonstrates that the classroom flip, if properly implemented with cooperative learning, can lead to increased academic performance.

   b. **Why this is important:** In a flipped classroom, lectures are replaced by online videos or readings, while class time is used to apply concepts and solve problems. Using this freed time in class to apply concepts individually did not yield much difference in final test score compared to traditional lecture style (that is also interspersed with active learning elements). However, when students worked cooperatively in randomly selected groups that lasted the whole semester their final test scores significantly outperformed those in a traditional lecture. This study calls for proper implementation of flipped classroom style when instructors choose to adopt it.

   
   a. **Published abstract:** Both repeated practice and sleep improve long-term retention of information. The assumed common mechanism underlying these effects is memory reactivation, either on-line and effortful or off-line and effortless. In the study reported here, we investigated whether sleep-dependent memory consolidation could help to save practice time during relearning. During two sessions occurring 12 hr apart, 40 participants practiced foreign vocabulary until they reached a perfect level of performance. Half of them learned in the morning and relearned in the evening of a single day. The other half learned in the evening of one day, slept, and then relearned in the morning of the next day. Their retention was assessed 1 week later and 6 months later. We found that interleaving sleep between learning sessions not only reduced the amount of practice needed by half but also ensured much better long-term retention. Sleeping after learning is definitely a good strategy, but sleeping between two learning sessions is a better strategy.

   b. **Why this is important:** Many people are aware of two strategies for maximizing the benefit of studying: space studying over time (don't "cram") and sleep after a study session. This article provides evidence that combining these two study strategies, i.e. sleeping between spaced study sessions, results in stronger, longer-term memory than utilizing either strategy alone. The results provide actionable study advice to give to students: study some material, go to sleep, and study that material again after waking.
   
   a. **Published abstract:** Acknowledging that brain training games don’t work, this article provides some tips based on applied memory research on learning and memory strategies that do work.

   b. **Why this is important:** Everybody, especially students, could benefit from enhanced learning and memory. Brain training games promise to provide just that, but unfortunately scientific evidence shows that they just don’t work. Students should instead adopt learning and memory strategies that are backed up by scientific evidence. This article details these strategies. It’s brief and written for a general audience, so teachers can read it and pass advice along to their students or even encourage students to read it for themselves.

   [http://dx.doi.org/10.1080/87567555.2016.1189389](http://dx.doi.org/10.1080/87567555.2016.1189389)
   
   a. **Published abstract:** Stories represent a fundamental way by which we interpret our experiences. They tap into our natural predispositions of seeking pattern, perceiving agency, simulating and connecting events, and imputing meaning into what we experience. Instructors can take advantage of this predisposition and facilitate student learning by viewing stories from a broad perspective and intentionally connecting stories and storytelling principles to the concepts and principles they want students to learn. Instructors can capture students' attention, nurture a more social atmosphere, and engage their students' emotions and cognitive abilities. Previous work on using stories to teach has highlighted four types of story-based instruction: case-, narrative-, scenario-, and problem-based. I extend this work by offering practical suggestions for incorporating stories into the classroom. I list possible objectives, discuss methods, and share examples that range from simply sharing a relevant story or anecdote or incorporating storytelling methods, to using a story framework to undergird an entire course. I then discuss various costs and benefits in the use of stories to facilitate learning. The methods I discuss can be used in a wide range of courses, and I encourage instructors to consider how they incorporate a broader, more intentional use of stories into their teaching.

   b. **Why this is important:** Usually, faculty in the sciences would not consider including stories into their teaching. This article is therefore relevant because it is written by a biology professor and it offers innovative ways to present materials in ways students find appealing and can relate to.

   
   a. **Published abstract:** Student-to-student peer review or peer feedback is commonly used in student-centered or active-learning classrooms. In this article, we describe a footnoting exercise that we implemented in two of our undergraduate courses as one way to encourage students to acknowledge collaborations and contributions made during peer-review processes. This exercise was developed in response to a teaching problem well documented in the literature and often experienced firsthand in our own courses: students do not always transfer to future iterations of their work what they have learned in response to previous feedback. Following a description of the footnoting exercise, we analyze
the resulting footnotes that the students produced. Finally, we discuss possible improvements to the assignment and avenues for future research.

b. **Why this is important:** This article offers a solution to problems many instructors face, namely whether students give each other good feedback and whether students respond to said feedback. It can be used in any discipline where writing is required.


   a. **Published abstract:** People are exposed to exemplary peer performances often (and sometimes by design in interventions). In two studies, we showed that exposure to exemplary peer performances can undermine motivation and success by causing people to perceive that they cannot attain their peers’ high levels of performance. It also causes de-identification with the relevant domain. We examined such discouragement by peer excellence by exploiting the incidental exposure to peers’ abilities that occurs when students are asked to assess each other’s work. Study 1 was a natural experiment in a massive open online course that employed peer assessment (N = 5,740). Exposure to exemplary peer performances caused a large proportion of students to quit the course. Study 2 explored underlying psychological mechanisms in an online replication (N = 361). Discouragement by peer excellence has theoretical implications for work on social judgment, social comparison, and reference bias and has practical implications for interventions that induce social comparisons.

   b. **Why this is important:** Teachers sometimes expose students to peers’ exceptional work to show students what great work looks like and to motivate the students to achieve. This research article suggests that this practice can do more harm than good, causing some students to experience a decrease in motivation and/or identification with the domain being studied. When exposing students to their peers’ work, perhaps sharing good (but not exceptional) peer work is a more preferable practice. If showing students truly exceptional peer work, be sure to help students set realistic expectations for their own performance.

   [http://pubs.acs.org/doi/abs/10.1021/acs.jchemed.5b00862](http://pubs.acs.org/doi/abs/10.1021/acs.jchemed.5b00862)

   a. **Published abstract:** Peer-led team learning (PLTL) research has expanded from its roots in program evaluation of student success measures in Workshop Chemistry to a spectrum of research questions and qualitative, quantitative, and mixed methods study approaches. In order to develop recommendations for PLTL research and propose best practices for faculty who will integrate PLTL in their classrooms, the theoretical frameworks, study designs, results, and limitations of sixty-seven peer-reviewed studies, spanning a variety of STEM disciplines and institution types, were examined. Five program evaluation themes emerged from this synthesis of the literature: student success measures; student perceptions; reasoning and critical thinking skills; research on peer leaders; and variants of the PLTL model. For each of the themes, areas for future study and implications for practice are suggested to STEM discipline-based education researchers and faculty.

   b. **Why this is important:** A large review of the literature on peer-led team learning (PLTL) that would be useful for anyone curious about PLTL or considering using it in their course. While PLTL originated in
chemistry and is largely associated with STEM disciplines, it has also been used effectively in non-STEM disciplines such as English.


   a. **Published abstract**: There are many variables that impact a classroom experience including the instructor, the student, and the class itself. Much research has been done in the area of undergraduate student expectations and preferences for instructors, course format, etc. This paper explores how specific student characteristics such as first-generation status, age, class level, and format impact students’ perception of what makes a good instructor. By understanding what instructor qualities these students appreciate, instructors can tailor their behavior to improve student learning and retention. Results suggest few differences within and between these groups of students. However, students had strong preferences for a high number of positive instructor characteristics, suggesting the possibility of overly optimistic and unrealistic preferences. Implications of this and suggestions for how instructors can better accommodate the preferences of students are discussed.

   b. **Why this is important**: This study shows that factors such as first-generation status, age, class level, and format (online vs face-to-face) had no significantly different effect on students’ expectations for instructors. All groups had similarly high (and somewhat unrealistic) expectations for instructors. Students generally wanted instructors who are approachable, enthusiastic, positive, knowledgeable (about content and technology), consistent, friendly, quick to respond, organized (especially in the online environment), and have strong teaching skills. These are generally qualities of good teaching, and the ability of instructors to meet students’ expectations of achieving these qualities can influence both student learning and retention.
Bonus: The 10 Best Blog Entries of 2016

1. “Small Changes in Teaching: The First 5 Minutes of Class”
4 quick ways to shift students' attention from life’s distractions to your course content.

2. “Benefits of Talking with Students about Mid-Course Evaluations”
Talking to students about formative mid-course evaluation (opposed to what is officially collected at end of the semester) takes a certain amount of courage from the instructor. However, collected data can be very useful in enhancing teaching and learning for students during the same semester and for future iterations of the course.
http://www.facultyfocus.com/articles/teaching-professor-blog/benefits-talking-students-mid-course-evaluations/

3. “Early Engagement in Course-Based Research Increases Graduation Rates and Completion of Science, Engineering, and Mathematics Degrees”
The results of the most definitive study to date to measure long-term student outcomes associated with their early participation in course-based undergraduate research experiences.
http://www.lifescied.org/content/15/2/ar20.abstract?etoc

4. “Learning More about Active Learning”
'Active learning' is a buzzword thrown around often these days—but what does it mean, beyond the strategies and teaching techniques? One professor argues that in order to truly help students learn, we must understand how they learn.

5. “A Practical Approach for Increasing Students’ In-Class Questions”
Steve Snyder presents a framework for developing students’ abilities to formulate questions in order to promote thinking skills and generate deeper discussions.
http://www.facultyfocus.com/articles/effective-teaching-strategies/practical-approach-increasing-students-class-questions/

A look at the modern underground economy of cheating that offers not just a customized paper or one-off assignment, but often the entire online class.
http://www.chronicle.com/article/The-New-Cheating-Economy/237587

7. “Jedi Mind Tricks in the Classroom”
Gathered from the Chronicle of Higher Education’s discussion forums, professors share their best tips and tricks for going about motivating students in a different way.
8. “A Fresh Take on Successful Group Work”
Translating the approach that successful teams in the private sector.
http://www.luminaris.link/blog/a-fresh-take-on-successful-group-work

9. “Enhancing Learning through Zest, Grit, and Sweat”
Lolita Paff identified three overlooked aspects of teaching that need to be promoted; (1) encouraging student intellectual curiosity, interest, and enthusiasm (zest), (2) an understanding that true long-lasting learning takes effort, hard and smart work (sweat), and (3) an academic growth mindset, perseverance and persistence (grit). Author gives tips on how to implement each of these three aspects in class.
http://www.facultyfocus.com/articles/instructional-design/enhancing-learning-zest-grit-sweat/

10. “Preventing Cell Phone Use in the Classroom”
Rodney C. Roberts offers the reader a quick tip on how to stop students from using their phones during classes and exams.
http://www.tandfonline.com/doi/full/10.1080/87567555.2015.1125844
Bonus: The 5 Best (Education-related) TED Talks of 2016

1. “This Virtual Lab Will Revolutionize Science Class” (11:26)
TED Description: Virtual reality is no longer part of some distant future, and it's not just for gaming and entertainment anymore. Michael Bodekaer wants to use it to make quality education more accessible. In this refreshing talk, he demos an idea that could revolutionize the way we teach science in schools.
https://www.ted.com/talks/michael_bodekaer_this_virtual_lab_will_revolutionize_science_class

TED Description: Challenges and problems can derail your creative process ... or they can make you more creative than ever. In the surprising story behind the best-selling solo piano album of all time, Tim Harford may just convince you of the advantages of having to work with a little mess.
https://www.ted.com/talks/tim_harford_how_messy_problems_can_inspire_creativity#t-458202

3. “Let’s Teach for Mastery – Not Test Scores” (10:49)
TED Description: Would you choose to build a house on top of an unfinished foundation? Of course not. Why, then, do we rush students through education when they haven't always grasped the basics? Yes, it's complicated, but educator Sal Khan shares his plan to turn struggling students into scholars by helping them master concepts at their own pace.
https://www.ted.com/talks/sal_khan_let_s_teach_for_mastery_not_test_scores

4. “Inside the Mind of a Master Procrastinator” (14:03)
TED Description: Tim Urban knows that procrastination doesn't make sense, but he's never been able to shake his habit of waiting until the last minute to get things done. In this hilarious and insightful talk, Urban takes us on a journey through YouTube binges, Wikipedia rabbit holes and bouts of staring out the window — and encourages us to think harder about what we're really procrastinating on, before we run out of time.
https://www.ted.com/talks/tim_urban_inside_the_mind_of_a_master_procrastinator

5. “Why You Think You’re Right – Even if You’re Wrong” (11:37)
TED Description: Perspective is everything, especially when it comes to examining your beliefs. Are you a soldier, prone to defending your viewpoint at all costs — or a scout, spurred by curiosity? Julia Galef examines the motivations behind these two mindsets and how they shape the way we interpret information, interweaved with a compelling history lesson from 19th-century France. When your steadfast opinions are tested, Galef asks: "What do you most yearn for? Do you yearn to defend your own beliefs or do you yearn to see the world as clearly as you possibly can?"
https://www.ted.com/talks/julia_galef_why_you_think_you_re_right_even_if_you_re_wrong