   
   [http://www.lifescied.org/content/15/3/es5.short](http://www.lifescied.org/content/15/3/es5.short)

   a. **Published abstract:** Efforts to retain underrepresented minority (URM) students in science, technology, engineering, and mathematics (STEM) have shown only limited success in higher education, due in part to a persistent achievement gap between students from historically underrepresented and well-represented backgrounds. To test the hypothesis that active learning disproportionately benefits URM students, we quantified the effects of traditional versus active learning on student academic performance, science self-efficacy, and sense of social belonging in a large (more than 250 students) introductory STEM course. A transition to active learning closed the gap in learning gains between non-URM and URM students and led to an increase in science self-efficacy for all students. Sense of social belonging also increased significantly with active learning, but only for non-URM students. Through structural equation modeling, we demonstrate that, for URM students, the increase in self-efficacy mediated the positive effect of active-learning pedagogy on two metrics of student performance. Our results add to a growing body of research that supports varied and inclusive teaching as one pathway to a diversified STEM workforce.

   b. **Why this is important:** Several studies indicate that active-learning pedagogies (ALP), characterized by in-class activities, pre-lecture preparation, and frequent low-risk assessment, increase student learning and performance for all students, and often disproportionately benefit URM students (compared with traditional lecture). This study confirms these findings and goes a step further, to investigate the underlying mechanisms leading to those benefits. The results indicate that students from different demographic groups may benefit in different ways from evidence-based teaching methods.

   

   a. **Published abstract:** Student Evaluations of Teaching (SETs) are used by nearly all public and private universities as one means to evaluate teaching effectiveness. A majority of these universities have transitioned from the traditional paper-based evaluations to online evaluations, resulting in a decline in overall response rates. This has led to skepticism about the validity and reliability of the SETs. In this study, a large, US public university transitioned to online SETs in 2007 and suffered a decline in overall response rates from 73% for the paper-based evaluations in 2006 to a low of 43%. The aim of this study was to determine successful strategies used by instructors to improve their own SET response rates. A survey was conducted of faculty members who had high response rates, and the data were analyzed to determine which strategies were being employed. The study found that when instructors show students they care about evaluations, response rates tend to be higher. The results from the study have been turned into a FAQ on myths and suggestions that has been distributed to the faculty at the university to provide guidelines for increasing response rates on SETs.
b. **Why this is important:** Collecting end-of-course evaluation is a common practice in U.S. Higher Education. It is used as relatively valid and reliable primary tool to assess teaching performance and inform decision on faculty salaries, reappointment and promotion. However, switching to online student evaluation resulted in low response rate, with biased unrepresentative responses, mainly from the two extremes of student population (those who are highly satisfied or highly dissatisfied). This study provides recommendations on how to increase student’s response rate for end-of-semester online evaluation. “The most often used strategy (by instructors who received 70% or more response rate) was merely talking about the importance of SETs in their classes, followed closely by creating an environment of mutual respect in the classroom.”

   
   a. **Published abstract:** Many educational policies provide learners with more resources (e.g., new learning activities, study materials, or technologies), but less often do they address whether students are using these resources effectively. We hypothesized that making students more self-reflective about how they should approach their learning with the resources available to them would improve their class performance. We designed a novel Strategic Resource Use intervention that students could self-administer online and tested its effects in two cohorts of a college-level introductory statistics class. Before each exam, students randomly assigned to the treatment condition strategized about which academic resources they would use for studying, why each resource would be useful, and how they would use their resources. Students randomly assigned to the treatment condition reported being more self-reflective about their learning throughout the class, used their resources more effectively, and outperformed students in the control condition by an average of one third of a letter grade in the class.
   
   b. **Why this is important:** Several studies over the years have shown positive results when students are taught metacognition—reflecting on how they study, what works, etc—but it’s often unclear which methods work best to communicate to students. This study provides a specific set of questions students can be given to increase their self-awareness about how to study, which shows a measurable increase in their test scores.

   a. **Published abstract:** Postsecondary education has undergone dramatic changes in the past 30 years or so. When I began teaching at the college level in the mid-1980s I went to class clutching my scribbled notes and a piece of chalk. If I scheduled it well in advance, a few times each semester I could have someone wheel in an overhead or film projector. Students typed papers and I provided handwritten feedback. I typed exams on a stencil, duplicated them on a mimeograph machine, and painstakingly graded each one by hand. Those were not the good old days. Today we have seemingly endless options available to us when it comes to the delivery of course material and the assessment of student learning. As instructors, we create learning environments rich in information from many sources. We encourage our students to engage with the material and become active learners rather than passive recipients of knowledge. As our views of teaching and learning continue to evolve, it is tempting to discard less exciting and more traditional methods altogether as we embrace the future. I would argue that the decidedly old-fashioned quiz, however, deserves a place in this brave new world of education.

   b. **Why this is important:** Quizzes, both announced and unannounced, have been shown to boost class attendance, completion of assigned readings, prudent time management, and long-term retention of information. Not surprisingly, these all correlate strongly with student success.


   a. **Published abstract:** This project evaluated the effectiveness of a course design within an upper-level biology course that incorporated what prior scholarship of teaching and learning (SoTL) research has suggested to be best practices for developing critical thinking skills while also managing the grading load on the instructor. These efforts centered on the development of a clearly articulated subset of skills identified by the Critical Thinking Assessment Test (CAT) as well as incorporated learning experiences designed to instill what we refer to as a “habit of critical investigation.” In this study, we tested the hypothesis that a single semester of an aligned course utilizing active learning and multiple opportunities for practice and feedback would: (a) increase the extent to which students agreed with the importance of questioning the credibility of claims across the semester, (b) increase the frequency at which students reported personally questioning the credibility of claims across the semester, (c) increase the number of students reporting investigation techniques consistent with critical investigation across the semester and (d) result in significantly greater student performance on the CAT questions that assessed the sub-skills practiced in the course when compared to the performance of a representative group of senior students at our institution. We observed substantial and significant gains in both the frequency at which students reported questioning claims and the degree to which their reported investigative actions were consistent with critical investigation. Furthermore, on the critical thinking sub-skills most aligned with what was practiced in the course, the experimental group significantly outperformed the comparison group.
b. **Why this is important**: The ability for students to think critically has never been more important. Critical thinking is frequently identified by institutions and employers alike as a crucial skill set for university graduates, resulting in a big push by higher ed administrators for incorporating these skills into courses. However, how to put that directive into practice is not always straightforward, particularly for large courses. This case study demonstrates a model for course design that allows for students to develop a subset of critical thinking skills in a way that is manageable for the instructor and results in gains in student achievement in those areas.


a. **Published abstract**: Instructional labs are widely seen as a unique, albeit expensive, way to teach scientific content. We measured the effectiveness of introductory lab courses at achieving this educational goal across nine different lab courses at three very different institutions. These institutions and courses encompassed a broad range of student populations and instructional styles. The nine courses studied had two key things in common: the labs aimed to reinforce the content presented in lectures, and the labs were optional. By comparing the performance of students who did and did not take the labs (with careful normalization for selection effects), we found universally and precisely no added value to learning course content from taking the labs as measured by course exam performance. This work should motivate institutions and departments to reexamine the goals and conduct of their lab courses, given their resource-intensive nature. We show why these results make sense when looking at the comparative mental processes of students involved in research and instructional labs, and offer alternative goals and instructional approaches that would make lab courses more educationally valuable.

b. **Why this is important**: This study shows no measurable added value to course performance in nine different physics lab courses, designed to reinforce student understanding of physics content. The authors describe this as a “broken link between intended learning goals and measures of student outcomes.” While the article is specific to physics, other disciplines might consider examining this issue in their own curriculum. The authors suggest that institutions consider alternative goals and pedagogies for labs, such as shifting the emphasis of lab activities towards skill development and the quality of students’ process, rather than the product, by including open-endedness and inquiry in activities.

a. **Published abstract:** The disadvantage to students of beginning a module with no prior knowledge or inaccurate knowledge is well documented. For learners, the development of the necessary prior knowledge to facilitate their learning is essential. The use of screencasts, whether prior to or during class, is becoming more widespread. There is a need, however, to better understand how these are used and whether or not there is any impact on overall learner engagement and academic achievement when a component with instantaneous feedback (such as a multiple choice quiz) is embedded into the pre-lecture screencast activity. In this study, pre-learning activities consisting of screencasts and multiple-choice quizzes were introduced to improve student engagement with the topic, gauge common misconceptions, and give timely feedback to the students. An examination of screencast usage indicated that students did not predominantly nor exclusively employ the resources as originally intended, that is, in advance of lectures. Rather, students continued to access the activities across the module and often after the associated lecture. Implications are discussed with an acknowledgement of the importance of taking into account how learners prefer to use resources when designing and introducing new activities to modules.

b. **Why this is important:** Students’ prior knowledge of topic consistently gives advantages to students and vice versa. Using MCQ to provide immediate feedback after watching screencasts before lectures, especially on unfamiliar topics/terminology at the beginning of a module, may have a potential for improving prior knowledge, and increasing personalized learning experience, especially in a flipped classroom. This preliminary study shows that, although using screencasts did not results in direct improvement in academic achievement, other benefits were achieved. For example: engaging student and assessing their prior knowledge before class, and using the MCQ response data to identify misconceptions and points of struggle.


a. **Published abstract:** The goal of this study was to research the frequency of the use of diverse types of humor in the college classroom for a possible association with student interest in course material. This relationship was studied using quantitative methods. Participants answered questions about their interest in course material and the type of humor that their instructor used in the classroom. The study involved 195 undergraduate students ranging in age from 18 to 25. A factor analysis recognized two separate types of humor (relevant/appropriate and non-relevant). The study found that both relevant/appropriate humor and non-relevant humor predicted student interest. The more relevant/appropriate humor used the more student had interest in course materials. As well, the more non-relevant humor used the less students reported interest in course materials. No differences were found between the gender of students in the classroom when examining this question of humor and interest.

b. **Why this is important:** Humor can be a useful tool for maintaining or increasing student interest, but not all varieties of humor work. This study will help instructors distinguish between effective and ineffective styles of classroom comedy.

   a. **Published abstract:** In an attempt to better understand factors contributing to students’ off-task electronic multitasking behavior in class, the research included two studies that developed a scale of students’ off-task electronic multitasking predictors (the SOTEMP scale), and explored relationships between the scale and various classroom communication processes and outcomes. The first study inductively developed initial typologies for the SOTEMP scale, refined the scale item pool, and explored the dimensions of the scale. Subsequently, the second study validated the scale through a confirmatory factor analysis and by assessing different concurrently existing communication processes as well as students’ perceived learning outcomes. Four factors were found: Lack of Class Relating, Technology Dependence, Class Easiness, and Overwhelmed feeling. Reliability and validity were established for the scale. Results indicated the SOTEMP scale was positively related to students’ cognitive absorption, and negatively related to students’ perception of their affective learning. However, the SOTEMP scale was not related to students’ perceived cognitive learning. Limitations and implications for future research are discussed.

   b. **Why this is important:** For many instructors, it may seem like an uphill battle for student attention in class these days. In addition to developing the first scale of off-task electronic multitasking, this paper offers suggestions for how to potentially reduce occurrences of off-task behavior and address the specific factors that cause students to engage in those behaviors.


   a. **Published abstract:** Laptop computers are widely prevalent in university classrooms. Although laptops are a valuable tool, they offer access to a distracting temptation: the Internet. In the study reported here, we assessed the relationship between classroom performance and actual Internet usage for academic and nonacademic purposes. Students who were enrolled in an introductory psychology course logged into a proxy server that monitored their online activity during class. Past research relied on self-report, but the current methodology objectively measured time, frequency, and browsing history of participants’ Internet usage. In addition, we assessed whether intelligence, motivation, and interest in course material could account for the relationship between Internet use and performance. Our results showed that nonacademic Internet use was common among students who brought laptops to class and was inversely related to class performance. This relationship was upheld after we accounted for motivation, interest, and intelligence. Class-related Internet use was not associated with a benefit to classroom performance.

   b. **Why this is important:** Landmark studies have shown since 2013 that students who take notes by laptop engage in dictation more than active listening and summary. This new study confirms common faculty intuition that students who have laptops are using them to engage in Internet activity rather than take notes, and that such activity led to lower grades. As a consequence, faculty should consider these findings when drafting classroom policies. One strategy may be to ban laptops, which despite student preference are not ideal for notes and present a hard to resist distraction.
**Bonus: The 5 Best Blog Entries of 2017**

1. **“Helping Students to “Work” Their Working Memory”**  
   An in-depth look at the mechanics of working memory and its role in the student learning process.  
   [http://nobaproject.com/blog/2017-09-28-helping-students-to-work-their-working-memory](http://nobaproject.com/blog/2017-09-28-helping-students-to-work-their-working-memory)

2. **“Reliable Sources: Promoting Critical Thinking in the [Mis]information Age”**  
   Three steps that students (and faculty) can take when they engage in a search for information in the era of “fake news.”  

3. **“Tapping into G-R-I-T to Enhance Students’ ‘Burn to Learn’”**  
   Suggestions for ways that we can foster growth, resilience, instinct, and tenacity in our students.  
   [https://www.pearsoned.com/tapping-into-g-r-i-t-to-enhance-students-burn-to-learn/](https://www.pearsoned.com/tapping-into-g-r-i-t-to-enhance-students-burn-to-learn/)

4. **“Laptops Are Great. But Not During a Lecture or a Meeting”**  
   The great debate over technology in the classroom continues, this time with an op-ed from a professor who advocates against students using them to take notes.  

5. **“Should Laptops Be Banned in Class? An Op-Ed Fires Up the Debate”**  
   A post in the Chronicle synthesizes the responses to New York Times laptop article.  
**Bonus: The 5 Best (Education-related) TED Talks of 2017**

1. **“The Boost Students Need to Overcome Obstacles” (7:05)**
   TED Description: How can disadvantaged students succeed in school? For sociologist Anindya Kundu, grit and stick-to-itiveness aren't enough; students also need to develop their agency, or their capacity to overcome obstacles and navigate the system. He shares hopeful stories of students who have defied expectations in the face of personal, social and institutional challenges.
   [https://www.ted.com/talks/anindya_kundu_the_boost_students_need_to_overcome_obstacles](https://www.ted.com/talks/anindya_kundu_the_boost_students_need_to_overcome_obstacles)

2. **“How Boredom Can Lead to Your Most Brilliant Ideas” (16:13)**
   TED Description: Do you sometimes have your most creative ideas while folding laundry, washing dishes or doing nothing in particular? It's because when your body goes on autopilot, your brain gets busy forming new neural connections that connect ideas and solve problems. Learn to love being bored as Manoush Zomorodi explains the connection between spacing out and creativity.
   [https://www.ted.com/talks/manoush_zomorodi_how_boredom_can_lead_to_your_most_brilliant_id eas](https://www.ted.com/talks/manoush_zomorodi_how_boredom_can_lead_to_your_most_brilliant_id eas)

3. **“Why You Should Love Statistics” (12:49)**
   TED Description: Think you're good at guessing stats? Guess again. Whether we consider ourselves math people or not, our ability to understand and work with numbers is terribly limited, says data visualization expert Alan Smith. In this delightful talk, Smith explores the mismatch between what we know and what we think we know.
   [https://www.ted.com/talks/alan_smith_why_we_re_so_bad_at_statistics](https://www.ted.com/talks/alan_smith_why_we_re_so_bad_at_statistics)

4. **“The Fascinating Physics of Everyday Life” (15:57)**
   TED Description: Physics doesn't just happen in a fancy lab -- it happens when you push a piece of buttered toast off the table or drop a couple of raisins in a fizzy drink or watch a coffee spill dry. Become a more interesting dinner guest as physicist Helen Czerski presents various concepts in physics you can become familiar with using everyday things found in your kitchen.
   [https://www.ted.com/talks/helen_czerski_fun_home_experiments_that_teach_you_physics](https://www.ted.com/talks/helen_czerski_fun_home_experiments_that_teach_you_physics)

5. **“How to See Past Your Own Perspective and Find Truth” (14:26)**
   TED Description: The more we read and watch online, the harder it becomes to tell the difference between what's real and what's fake. It's as if we know more but understand less, says philosopher Michael Patrick Lynch. In this talk, he dares us to take active steps to burst our filter bubbles and participate in the common reality that actually underpins everything.
   [https://www.ted.com/talks/michael_patrick_lynch_how_to_see_past_your_own_perspective_and_fin d_truth](https://www.ted.com/talks/michael_patrick_lynch_how_to_see_past_your_own_perspective_and_fin d_truth)

**Bonus: TED-Ed Original Lessons**
TED-Ed Original lessons feature the words and ideas of educators brought to life by professional animators.

*Example: Why Do People Get So Anxious About Math? – Orly Rubinsten*