Whether we were ready or not, Spring has sprung! Check out these updates and opportunities:

- Project-based learning workshop recap
- What do our faculty want to learn?
- Spring reading group and project-based learning community
- From the literature: do labs actually work?
If you missed it...

Project-Based Learning Workshop

Before the semester started, ~18 brave souls participated in a two-day workshop on project-based learning, hosted by experts from Worcester Polytechnic Institute.

WPI's experts shared:

- compelling rationales for project-based learning (e.g., employers want the skills students gain in projects; alumni value what they gained in projects)
- great model projects (e.g., can student design more efficient solar charging circuits that allow women to go to school at night in African towns without electricity?)
- real hands-on teaching advice for faculty (e.g., how can we help all students contribute their best in group work?)
- and much, much more!

**What did participants think?**

84% of participants said the workshop helped them understand how PBL could help improve teaching and student learning much or very much.

100% of participants said the workshop provided many or very many ideas, examples, and tools to support PBL in their courses.

"I thought it would be helpful, but I'm really excited by the help, examples, ideas of how to make teamwork work."

"I believe all of us who attended will certainly stay connected as we work on our PBL projects. I hope that we will also bring in additional faculty that we feel would personally benefit as well but who could not attend."

"This was an unqualified positive experience in giving me specific strategies, powerful motivation, and connecting me with helpful resources to implement project based learning in my classroom."

If you missed the workshop, but are interested in hearing more about it, or seeing some of the classroom resources WPI shared, ask Tara or Jeremy or folks in your department who attended.
Our faculty are ready

We asked faculty in the PBL workshop what topics they might want to learn more about. The results were striking - our faculty are so very ready to learn about and try new instructional approaches.
We can do that...

Spring STEMed Reading Group

As you saw above, faculty are interested in learning about teaching in authentic contexts, using rubrics and peer evaluation in group work, active learning strategies, and much more.

Faculty who participated in the project-based learning workshop also wanted to find a mechanism to meet and continue that work.

We are tackling these issues head on with a great book by Terry Doyle that starts from the literature on learning and cognition and leads to practical solutions we can use in our classrooms.

Reading groups are open to any interested faculty member.

We will meet in CS 286, Fridays, at 1pm.

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| 2/2/18 | Doyle, Chapters 1-2  
Follow the Research  
Getting Students to Do the Work |
| 2/9/18 | Project-based learning implementation community:  
What assignments are you planning to implement, what help do you need from your peers? |
Do labs work? A cautionary tale about the value of defining and assessing learning outcomes

Many faculty design lab experiences for their students in order to reinforce the content and concepts covered in lecture. In fact, many faculty work really hard to coordinate the timing of concepts in their lectures and labs. Holmes and Wieman (2018) just published a shocking set of results about how well science
labs reinforce content. Their answer? Not well at all.

Holmes and Wieman were studying Physics courses, though \textit{a priori} there is no reason to suspect the results would be different in Biology or Chemistry. They used a fairly rigorous approach, comparing student performance among those who took or didn’t take the lab on specific content that was covered in lecture or both lecture and lab. Across three institutions, seven instructors, and a range of concepts, there was no measurable impact of the lab on student learning of concepts (Figure 1). Yikes!

![Figure 1. The mean lab benefit at three institutions shows no measurable impact on student course performance from enrolling in the associated lab course. Mean lab benefit was obtained by first calculating each student’s fractional score on the lab-related questions minus their fractional score on the non-lab-related ones. Next, the average of those differences was calculated for each group of students (those taking and those not taking the lab). Mean lab benefit is then the difference between the group averages. Error bars represent standard error of the mean. (from Holmes and Wieman 2016. Mech = mechanics, E&M = electricity and magnetism)"

Of course, labs may teach students other important skills, like the process and accuracy of measurement, how to use particular instrumentation, experimental design, teamwork, and/or the ability to write scientifically. These learning outcomes seem logical, and perhaps likely, but so did lab’s ability to reinforce concepts, before Holmes and Wieman assessed it.

It is not all doom and gloom, however. Holmes and Wieman also found that open-ended, project-based labs challenged students to tackle many of the same cognitive tasks that faculty-mentored undergraduate research experiences did, tasks like determining feasibility, designing experiments,
analyzing results, and presenting findings. Students taking highly structured, “cookbook” labs did not report being challenged with the same cognitive tasks, though.

Not by coincidence, the Biology and Physics departments at Radford have signed on to the Council on Undergraduate Research’s Transformations project, to embed project-based learning and authentic research into our science curricula. There is a large literature base supporting those curricular changes, and it is encouraging that even the most critical examinations of at what is happening in science classrooms find support for where we are headed.


**Want more information on course-embedded undergraduate research experiences, and their advantages over traditional labs?**


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An invitation...

Whether you are interested, excited, nervous, or skeptical, we’d love to meet with you one-on-one for an informal chat about how we can:
• help you share your own expertise and experience with others that could benefit.
• use your concerns to improve the project as we go.
• help you find what you need to try something new in your course (e.g., materials, time, technical or instructional expertise).
• help you identify a part of the initiative that resonates with what you already do and value.
• plan for how you can get involved.
• define what the hell "Inclusive Excellence" is, anyways...

Contact Tara or Jeremy, and we can share some ideas over coffee.