

MIT **BLOSSOMS** Announcement:
New Turnkey Project-Based Learning Resources for High School STEM Teachers

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MIT BLOSSOMS, an international education initiative founded in 2008 to encourage high school STEM teachers to pursue more active, student-centered learning, has recently enlarged its focus to support those teachers in moving to Project-Based Learning. Project-Based Learning (PBL) is an emerging teaching/learning strategy. The traditional teaching/learning model has students passively “receiving content” from the teacher, practicing with homework, memorizing for the next exam and then – tragically – often forgetting it all. PBL offers a substantially different experience where the teacher helps students form small teams and then challenges each team to work on a demanding problem over the course of weeks. The ideal problem is socially important, located in the real world -- preferably in the students’ community, and requires mature application of STEM knowledge. The complexity of the problem is such that it has no right or wrong answer, a situation often troubling to students used to formulaic learning. Rather, the team must devise its own procedures for problem framing, formulation, and resolution. In the course of this effort, where now the teacher is mentor or coach, students experience discovery learning -- in sharp contrast to taking lecture notes. They also must develop 21st Century skills involving cooperation, collaboration, conflict resolution and reaching out to local professionals who work in the domain of the assigned problem. The team’s problem resolution is typically presented in a final written report and public oral presentation, often with local stakeholders attending. It is a learning exercise that these students will likely never forget!

Yet imagine the challenge for a teacher to design and operate such a PBL project over the course of three to five weeks, while still having to prepare and give lectures for other required topics. This huge teacher preparation “start-up cost” (in terms of time and energy) is certainly one reason why many high school STEM teachers hesitate to try PBL, although they may want to. Our new MIT BLOSSOMS PBL units are designed for just such a teacher – someone who wants to give PBL a try, but is not sure just how to get started. The first five MIT BLOSSOMS PBL units listed below can be found at: <https://blossoms.mit.edu/projects>

- [Green Chemistry](#)
- [Special Properties of Water](#)
- [Tragedy of the Commons](#)
- [Complex Systems](#)
- [User-Centered Design](#)

Each of these units is developed to provide a teacher with all the resources and scaffolding needed to lead a three to five-week classroom project. To begin, each unit kicks off from a BLOSSOMS video lesson, thus providing the teacher with anchoring content and clear direction. Teachers have informed us that one of the most useful scaffolds provided in these units is the “Project Calendar,” which offers a detailed, flexible day-by-day schedule for the unit. This calendar includes downloadable resources to lead the project, such as lesson plans, teacher notes, slide presentations, student handouts, homework assignments, etc. -- thus removing myriad hours of preparation time for teachers who might not try PBL without such scaffolding. Other valuable resources provided with each of the five BLOSSOMS units include “Video Teacher Guides,” “Summative Assessments,” “Project-Based Learning Tools,” “Teacher Questions/Answers about PBL”, and a discussion of “Common Student Concerns During PBL.”

As illustration, consider the PBL unit, “Green Chemistry.” This 2-part unit, developed by two Massachusetts high school Chemistry teachers, starts on Day 1 with students experiencing in class the BLOSSOMS interactive video lesson, “Introducing Green Chemistry: The Science of Solutions”. Building on knowledge gained in this video and new lessons provided in the unit, student teams will pursue the following Driving Question: “How can we become a sustainable community through the 12 principles of Green Chemistry.” During the 4-week Part 1 project of this unit, student teams will conduct comprehensive life cycle analyses of commercial products commonly used in their community and present their results to stakeholders, recommending which products are equally effective, yet more sustainable. During the 4-week Part 2 project of this unit, student teams will select, research and test the life cycle of a commercial product and compare it to that of a mushroom-based alternative product that they will design and develop. These teams will also present their test findings to an audience of interested stakeholders. Each part of this PBL unit introduces students to important issues of pollution and sustainability, and provides them with invaluable team experiences of problem-solving, collaboration, creative thinking and contributing to their communities.

All five new PBL units have similar categories of content – though each is quite unique - and are invaluable to teachers and students alike! It is our ultimate aim that these units will be valuable stepping stones as teachers grow in confidence about developing their own PBL units!

Education professionals are looking forward to using these new PBL resources. According to Michael Lauro, Associate Executive Director of the Atlantis Charter High School in Fall River, Massachusetts, *“We have learned much from collaborating with the MIT BLOSSOMS team over the past three years. We think we have played some role in helping BLOSSOMS define their PBL capabilities, and we look forward to using in our classrooms these five new PBL exercises in the coming academic year.”*

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