

Elevate Science Problem-Based Learning

Problem-based learning (PBL) is an instructional pedagogy based on students developing solutions for open-ended problems - a problem with no “correct” answer. Used for decades by medical schools as case studies for student diagnosis of patient complaints, PBL is also used in K-12 science classrooms worldwide. This research-proven pedagogy invites students to study real world problems through research, team work, and presentation.

The Buck Institute in northern CA provides cutting-edge training and materials for effective classroom PBL.

www.bie.org

In problem-based learning an open-ended problem is presented to students as a *driving question*. Sample problems or driving questions are listed below.

- Should an animal crossing be built?
- Where should a new concert stadium be built?
- What new design can you make for a prosthetic device?

There are many important steps in effective PBL. Students work in small groups to perform research, develop a plan, conduct investigations or build design solutions. Students should synthesis research from varied sources. They should obtain feedback from various groups and incorporate that feedback. Finally, developing a product, whether it be a presentation, PSA, video, or prototype, and presenting or communicating it to an applicable stakeholder group is a critical feature of PBL. For example, students could present their prosthetic device to biomedical engineers. They could present plans for the location of a new concert stadium to a local city council.

PBL is made most meaningful by using real local problems. Read local news websites – every city, town or suburb struggles with issues. Many issues are science related. Some have over population of a certain species, some have too much recycled material, or some have noise or pollution concerns. And to be most effective, have *students* choose which problem they will study. *Let them* develop their driving question.

Here are some basic steps below to follow during a PBL activity.

Launch Project – the Driving Question

- Understand the driving question
- Determine what needs to be researched – what do you need to know
- Define the final product

Build Knowledge, Understanding, & Skills to Answer the Driving Question

- Discuss teamwork expectations
- Teams define next steps
- Build background knowledge and skills

- Investigate, gather, record synthesize information
- Team begins design of final product

Develop and Revise Products and Answers to the Driving Question

- Working sessions and discussion
- Review/Refine/Revise Need-to-Know list
- Ask new questions
- Finalize final product/presentation

Present Products that Answer the Driving Question

- Presentations and Feedback
- Final assessment

In *Elevate Science* we incorporate a modified or simplified form of PBL in our K-8 Quests. Instead of the projects being separate from the curriculum, the driving question is embedded in the topic. Students answer the driving question as they complete the lessons in the topic. In K-5 students can complete the questions in the confines of their write-in student edition. In 6-8 students go online to complete digital activities and complete hands on labs as they gather evidence to answer the driving question or build a design solution.