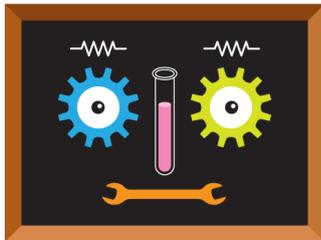


**PROJECT-BASED LEARNING**

# PBL and STEAM Education: A Natural Fit

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Both project-based learning and STEAM education (science, technology, engineering, art and math) are growing rapidly in our schools. Some schools are doing STEAM, some are doing PBL, and some are leveraging the strengths of both to do STEAM PBL. With a push for deeper learning, teaching and assessment of 21st-century skills, both PBL and STEAM help schools target rigorous learning and problem solving. They are not exactly the same, but teachers can easily connect to them to teach not only STEAM content and design challenges, but also authentic learning and public, high-quality work. In

fact, many know that STEAM education isn't just the content, but the process of being scientists, mathematicians, engineers, artists and technological entrepreneurs. Here are some ways that PBL and STEAM can complement each other as you deliver instruction.

## From Design Challenges to Authentic Problems

Many of us have experienced, either as a teacher or student, the bridge design challenge. It often unfolds in this way. Students are given the challenge to make a bridge out of materials that will hold the most weight. These materials might be marshmallows, glue, toothpicks and the like. Students are given multiple opportunities to try out ideas and refine their work. It might culminate in a public content or presentation day when the bridges are tested for the last time. This is a fun and engaging design challenge that encourages the freedom to fail as well as opportunities for revision, reflection and using critical thinking skills.

PBL can take this design challenge up a notch. Instead of just designing a "fake" bridge, students might actually make recommendations to real architects and engineers for local bridges that need repairs. Some further math or physics content might be intentionally included and scaffolded so that students end up writing a rigorous design briefing and make a public presentation to the architects. Here the work can be more authentic and perhaps make a real difference as students truly become designers of real-world STEAM work.

In the following video about the Wing Project, these teachers crafted a design rubric and assessed the design process as a 21st century skill:

## Wing Project: Plan the Assessment



### 21st Century Skills

One of the essential elements of PBL is the 21st century skillset. These skills are often defined as the 4Cs -- creativity, collaboration, critical thinking and communication -- although there are many more, including technology literacy and health literacy. In a PBL project, teachers teach and assess one or more of these skills. This might mean using an effective rubric for formative and summative assessment aligned to collaboration, collecting evidence, facilitating reflection, and scaffolding many quality indicators and collaboration skills within the PBL project. Although STEAM design challenges foster this naturally as an organic process, PBL can add the intentionality needed to teach and assess the 21st century skills embedded in STEAM.

For example, a teacher might choose to target technology literacy for a PBL STEAM project, build a rubric in collaboration with students, and assess both formatively and summatively. In addition, the design process, a key component of STEAM education, can be utilized. Perhaps a teacher has a design process rubric used in the PBL project, or even an empathy rubric that leverages and targets one key component of the design process. When "marrying" PBL and STEAM in projects, the 21st century skills not only fit well, but fit intentionally into the assessment process.

### Integrated Disciplines

Project-based learning can target one or more content areas. Many PBL teachers start small in their first implementations and only pick a couple of content areas to target. However, as teachers and students become more PBL-savvy, STEAM can be great opportunity to create a project that hits science, math, technology and even art content. The key is to start with the content. When teachers design projects, they need to leverage the backwards design framework and begin with the end in mind. The questions should be:

- What STEAM content will be assessed?
- What products will students create to demonstrate mastery of these many content standards?

As STEAM focuses on integration of content, pairing STEAM with PBL can hit not only STEAM content, but also content outside of the core STEAM subjects. English can be integrated, as well as foreign languages

and social studies. It's all about designing effective PBL that targets these content areas.

As STEAM and PBL continue to grow in implementation, teachers can fit them together in curriculum and instructional practice. Additionally, these two approaches can capitalize on each other's strengths and fill each other's potential gaps. The key is an intentionality in design that recognizes what might be missing from each approach. Engage in your own design challenge to create STEAM PBL projects, and share your work with like-minded practitioners.

And if this is something you've tried or currently practice, please share your experiences in the comments section below.

**Source:** [www.edutopia.org/blog/pbl-and-steam-natural-fit-andrew-miller](http://www.edutopia.org/blog/pbl-and-steam-natural-fit-andrew-miller)

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