Top 5 tips

Getting started with STEAM-infused PBL

Creative Tinkerers #1: Start small and build from there.

When you are trying to get more tinkering into your classroom, simply create a small area where you place recyclable materials that students can use to build things. Small cardboard boxes, foam pellets, bubble wrap, water bottles and produce bands are all great materials for building prototypes. You would be surprised how many students love to come in during their lunchtime to tinker!

Include literature, a tablet device and a computer for the students to tinker with programs and information. Great ideas and wonderings come from free explorations. Have specific sites for the students to explore based on standards at your grade level. Coding, museums, science content and real-life math applications are great areas for students to explore. (See References and Additional Resources for examples of sites.) Perusing high-interest, visually appealing STEAM books is one of my students’ favorite things to do.

Cycling Processors #2: Follow the engineering design process.

Post the engineering cycle or the modified engineering cycle where students can visually reflect on their progress. Use both explicit and constructivist instruction to guide students through the engineering design cycle.

If you are new to PBL and the engineering design cycle, start small with a very teacher-directed approach. Provide four or five relevant and engaging ideas for students to choose from. As you work your way through the engineering design process with the students and see their enthusiasm and divergent thinking, you will be amazed and motivated to move toward a more student-directed approach. Continue to read about PBL and STEAM to help guide you in becoming an expert in the STEAM-infused PBL approach. (See References and Additional Resources for examples of books and websites to learn more about PBL and STEAM.)

Curious and Critical Thinkers #3: Make ideas visible and accessible.

Keep a Wonderings butcher paper board in a place where you and the students can add ongoing questions and curiosities. Every once in a while, organize the wonderings into categories to help guide the next possible PBL idea. Then, put out another Wonderings board.
Clarifying Content Communicators #4: Focus on clear communication.

Use both explicit instruction and constructivist instruction to guide the students through skills, processes and content. For students to be able to develop and use models and discuss those models in depth (NGSS science and engineering practice), start by giving students explicit instruction on the purpose and limitations of models and directions on how to discuss, compare and critique their own and others’ work in a respectful, positive way. Next, students need to actually develop and build their own models, and to experience firsthand the purpose and limitations of models. In addition, for students to become high-level communicators, they need to practice discussing, probing, clarifying, comparing and critiquing their work and others’ work in an authentic, student-driven manner. (See References and Additional Resources for books and websites that will help you learn more about explicit, constructivist instruction and teaching students how to communicate more meaningfully.)

Persistent Refiners #5: Emphasize the importance of revision and refinement.

If the students are not used to PBL or inquiry-based STEAM instruction, it will take time for them to understand that a first idea or draft is not the end result to turn in for a grade. Many students have had years of being filled with content information, spitting that information out on a multiple-choice test for a grade, then promptly forgetting most of what they learned for the test. STEAM-infused PBL will be a huge paradigm shift for them. Be patient with their confusion, and enthusiastically guide them through the thrill of rehypothesizing, redesigning, reinvestigating, reanalyzing and recritiquing their work. As you work through the first few STEAM-infused PBLs with your students and wonder if they will ever stop asking you if this will be on the test or if this activity is for a grade, remember that once the students find joy in the work, it then becomes difficult for them to end the project; they want to keep asking questions and keep perfecting their work!

Thoughtfully constructed rubrics help the students to become persistent refiners. Rubrics used for formative assessment assist the students and the teacher in excelling at skills, processes, content, performance and product attainment. The more you learn about formative assessment, the better facilitator you can become for your students. (See References and Additional Resources for examples of books and websites to learn more about formative assessment.)